TOSHIBA
Leading Innovation

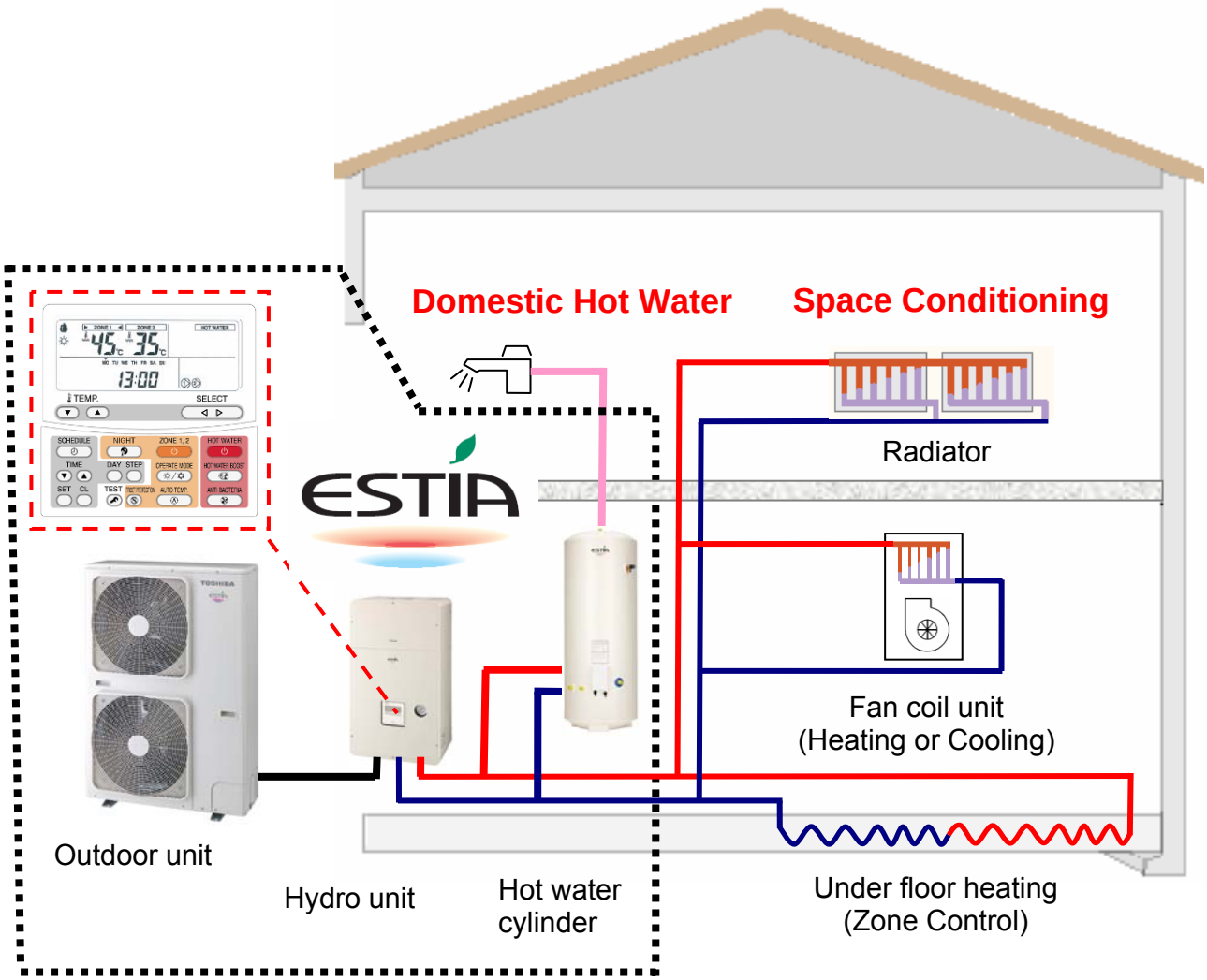
FILE NO : A09-01P

Quick reference

Air To Water Heat Pump

ESTIA

Estia System



Estia Outdoor Unit

HWS-802H-E	8.0kW Inverter (use Hydro Unit: HWS-802XWH**-E)
HWS-1102H-E	11.2kW Inverter (use Hydro Unit: HWS-1402XWH**-E)
HWS-1402H-E	14.0kW Inverter (use Hydro Unit: HWS-1402XWH**-E)

Estia Hydro Unit

HWS-802XWHM3-E	Plate Heat exchanger and 3kW Backup Heater
HWS-802XWHT6-E	Plate Heat exchanger and 6kW Backup Heater
HWS-1402XWHM3-E	Plate Heat exchanger and 3kW Backup Heater
HWS-1402XWHT6-E	Plate Heat exchanger and 6kW Backup Heater
HWS-1402XWHT9-E	Plate Heat exchanger and 9kW Backup Heater

Estia Hot Water Cylinder (EU)

HWS-1501CSHM3-E	150L Stainless Steel Tank (with EU Accessories)
HWS-2101CSHM3-E	210L Stainless Steel Tank (with EU Accessories)
HWS-3001CSHM3-E	300L Stainless Steel Tank (with EU Accessories)

Estia Hot Water Cylinder (UK)

HWS-1501CSHM3-UK	150L Stainless Steel Tank (with UK Accessories)
HWS-2101CSHM3-UK	210L Stainless Steel Tank (with UK Accessories)
HWS-3001CSHM3-UK	300L Stainless Steel Tank (with UK Accessories)

Note:
Under floor heating, Fan Coil units, Radiators, valves and Hot Water Piping are procured locally.

Notes on System Design

• The input water temperature to the Hydro Unit must be 55°C or less.
Especially, be careful when there is an external heating source such as a boiler.
When hot water over 55°C returns, it may result in a failure of the unit or water leakage.
• The flow rate of the circulating water must meet the following range:-
11 and 14 kW 17.5 L/minute or more
8 kW 13 L/minute or more
If the flow rate becomes less than the minimum, the protective device is activated to stop operation.
Ensure the flow rate with a bypass valve, etc. when you use a flow rate valve for the Hydro Unit.
• Do not drive water by power other than the pump built in the Hydro Unit.
• The backup heater operates supplementary to exert a prescribed capacity when the heat pump cannot exert its capacity at a low outside temperature.
• Install the Hydro Unit and water pipes in a place in which they do not freeze.
• Make the water circuit closed. Never use it as an open circuit.
• To prevent damage to the system during outdoor defrost the circulating water must be **20 litres or more**. If total water amount is not enough, the unit may not function fully due to protective operation.

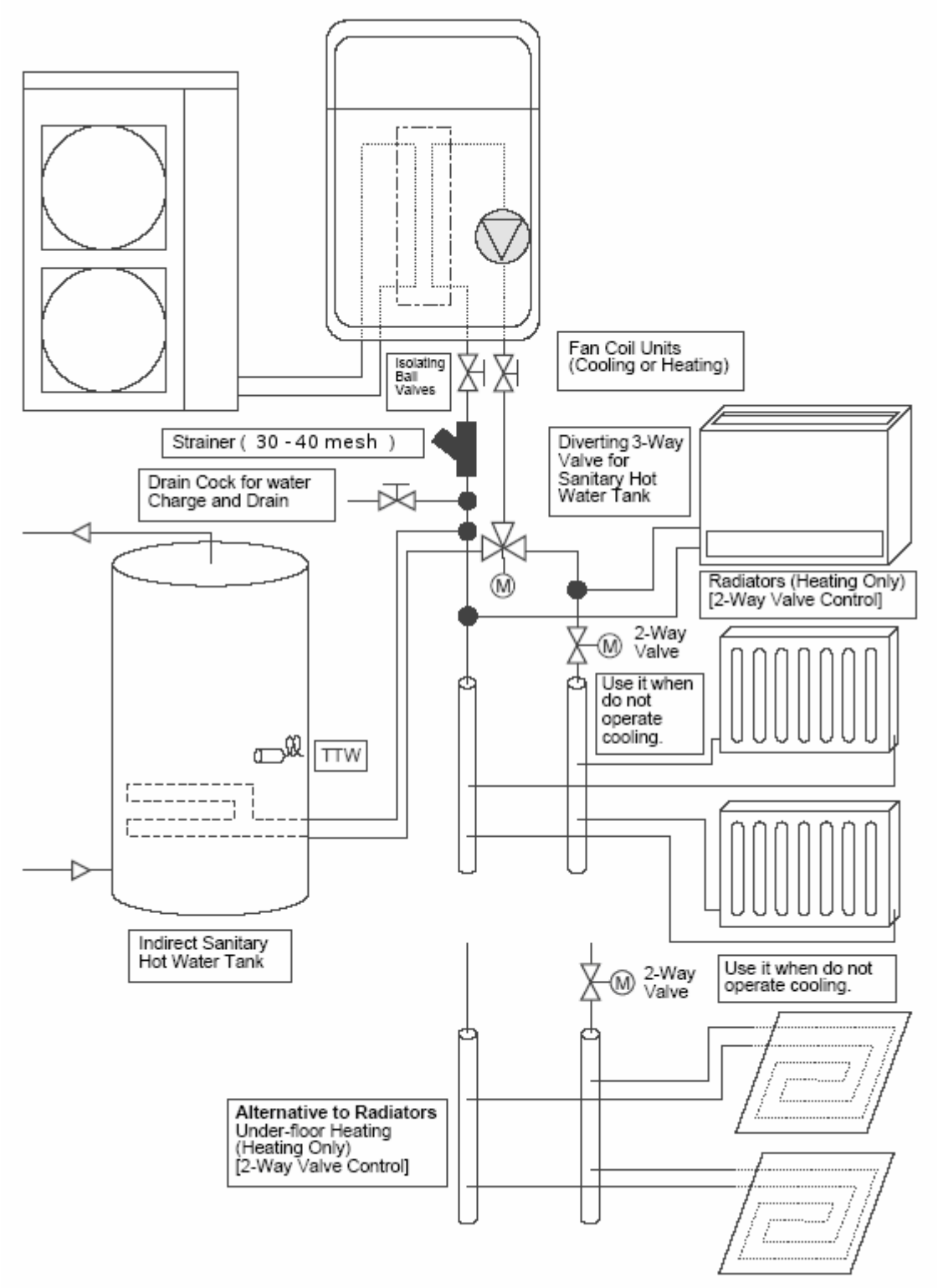
Options required for each function

<table>
<tr><th rowspan="2">Purpose</th><th colspan="2">Toshiba Supply</th><th>Procure locally</th></tr>
<tr><th>Part name</th><th>Model code</th><th>Part name</th></tr>
<tr><td>Space Heating</td><td>-</td><td>-</td><td>Radiator(s),
Fan coil(s),
Under floor heating</td></tr>
<tr><td>Space Heating &
Space Cooling
(All Rooms)</td><td>-</td><td>-</td><td>Fan coil(s) only</td></tr>
<tr><td>Space Heating &
Space Cooling
(partly heating only)</td><td>-</td><td>-</td><td>Fan coil(s) plus
Radiator(s)
or Under floor heating
Motorized 2-way valve</td></tr>
<tr><td rowspan="6">Domestic Hot Water</td><td>150L Hot water cylinder</td><td>HWS-1501CSHM3-E</td><td rowspan="6">Motorized 3-way valve
Earth leakage breaker</td></tr>
<tr><td>150L Hot water cylinder</td><td>HWS-1501CSHM3-UK</td></tr>
<tr><td>210L Hot water cylinder</td><td>HWS-2101CSHM3-E</td></tr>
<tr><td>210L Hot water cylinder</td><td>HWS-2101CSHM3-UK</td></tr>
<tr><td>300L Hot water cylinder</td><td>HWS-3001CSHM3-E</td></tr>
<tr><td>300L Hot water cylinder</td><td>HWS-3001CSHM3-UK</td></tr>
<tr><td rowspan="3">2-zone control</td><td rowspan="3">-</td><td rowspan="3">-</td><td>Motorized mixing valve</td></tr>
<tr><td>Circulator pump</td></tr>
<tr><td>Buffer tank</td></tr>
<tr><td>Interlocking with boiler</td><td>Output control board kit (1)</td><td>TBC-PCIN3E</td><td>Boiler</td></tr>
<tr><td>Interlocking with booster heater</td><td>-</td><td>-</td><td>Electric heater</td></tr>
</table>

Installation Examples

Space Cooling and Space Heating with Domestic Hot Water

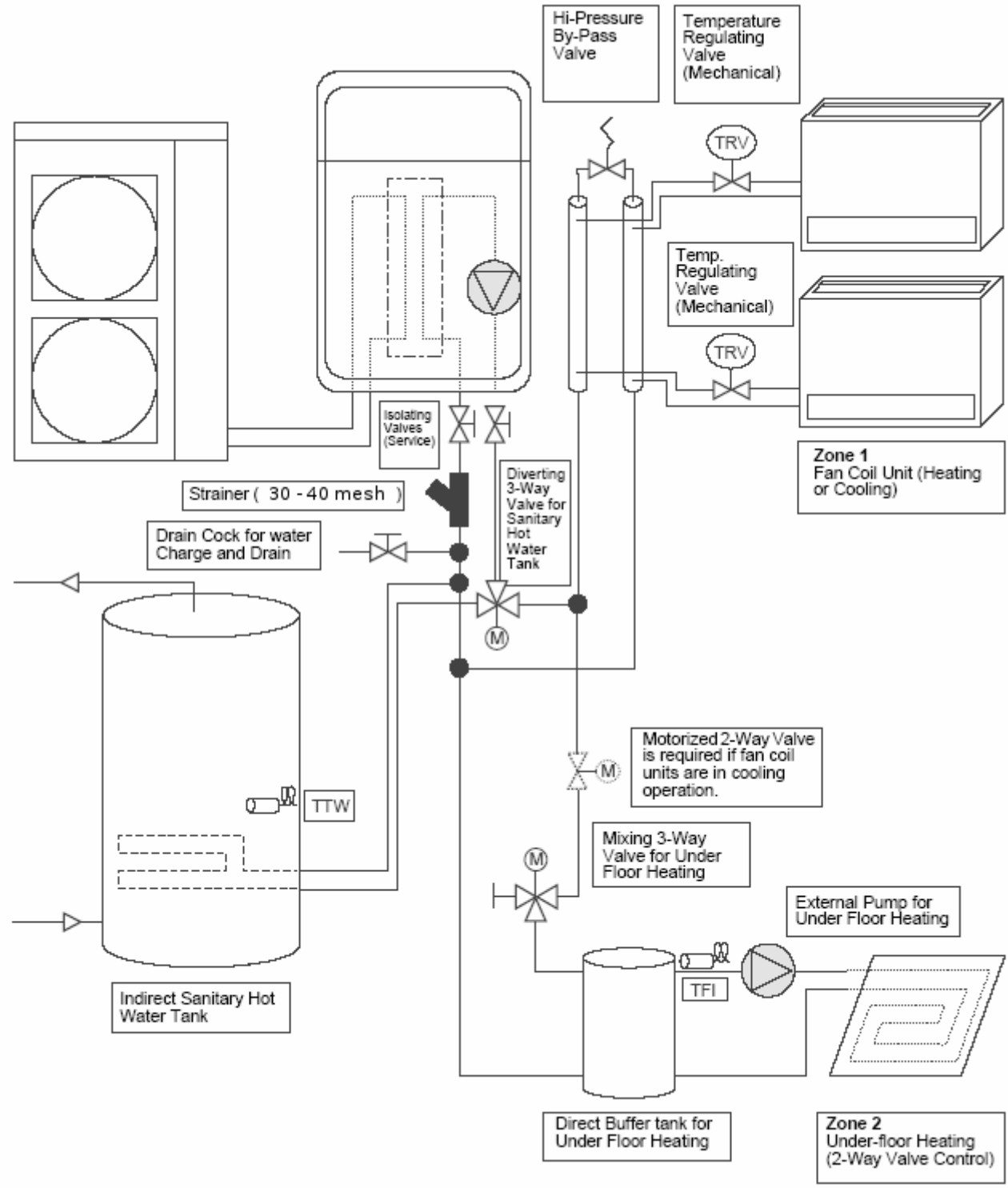
When both cooling and heating are used, install a 2-way valve (for cooling) to the pipe to the room for heating only.


Isolating Ball Valves
Fan Coil Units (Cooling or Heating)
Strainer (30 - 40 mesh)
Drain Cock for water Charge and Drain
Diverting 3-Way Valve for Sanitary Hot Water Tank
M
Radiators (Heating Only) [2-Way Valve Control]
M 2-Way Valve
Use it when do not operate cooling.
TTW
Indirect Sanitary Hot Water Tank
M 2-Way Valve
Use it when do not operate cooling.
Alternative to Radiators
Under-floor Heating
(Heating Only)
[2-Way Valve Control]

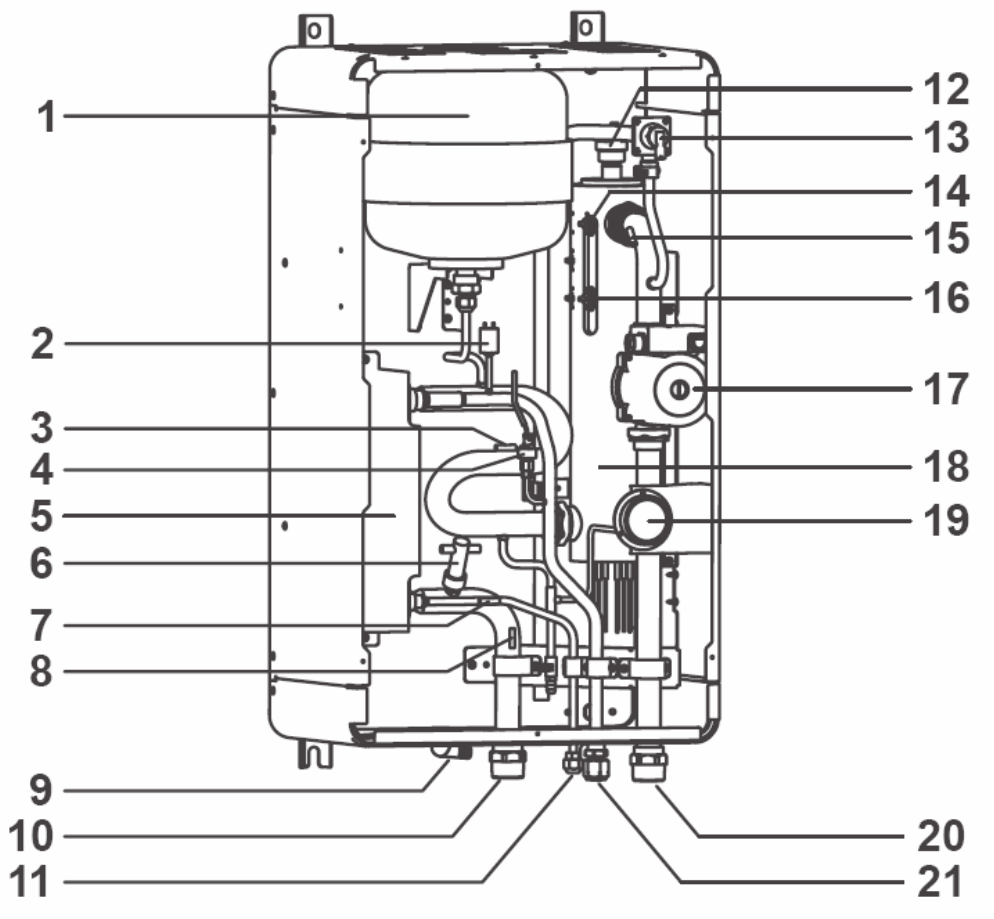
Installation Examples (cont.)

2-Zone Space Heating with Domestic Hot Water

The following shows an example of the 2-zone temperature control.
A buffer tank and a water pump are required for the 2-zone temperature control. This example is Heating only, if the Fan Coils are to be used for Cooling then a 2-Way valve must be fitted.


Hi-Pressure By-Pass Valve
Temperature Regulating Valve (Mechanical)
TRV
Temp. Regulating Valve (Mechanical)
TRV
Isolating Valves (Service)
Zone 1
Fan Coil Unit (Heating or Cooling)
Strainer (30 - 40 mesh)
Diverting 3-Way Valve for Sanitary Hot Water Tank
Drain Cock for water Charge and Drain
M
Motorized 2-Way Valve is required if fan coil units are in cooling operation.
M
TTW
Mixing 3-Way Valve for Under Floor Heating
M
External Pump for Under Floor Heating
TFI
Indirect Sanitary Hot Water Tank
Direct Buffer tank for Under Floor Heating
Zone 2
Under-floor Heating (2-Way Valve Control)

Hydro Unit – Exploded View

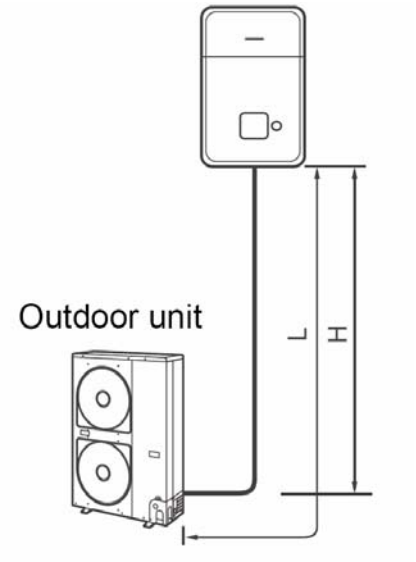


1 : Expansion vessel
2 : Hi pressure switch (4.15 MPa)
3 : Temperature sensor (for Heat pump outlet -TWO)
4 : Pressure sensor
5 : Heat exchanger
6 : Flow switch (13.0 L/min 17.5 L/min)
7 : Temperature sensor (for refrigerant -TC)
8 : Temperature sensor (for water inlet -TWI)
9 : Drain nipple
10 : Water inlet connection
11 : Refrigerant liquid connection
12 : Air relief valve
13 : Pressure relief valve (0.3 MPa (3 bar))
14 : Thermal protector (auto)
15 : Temperature sensor (for water outlet THO)
16 : Thermal protector (Single operation)
17 : Water pump
18 : Backup heater (3 kW, 3 kW x 2, 3 kW x 3)
19 : Manometer
20 : Water outlet connection
21 : Refrigerant gas connection

Refrigerant Piping

Refrigerant Pipe Lengths and Height

The length and height of the refrigeration pipe must be within the following values.



Minimum Pipe Length

HWS-802H-E : 5 m
HWS-1102H-E : 3 m
HWS-1402H-E : 3 m

Maximum Pipe Length and Height

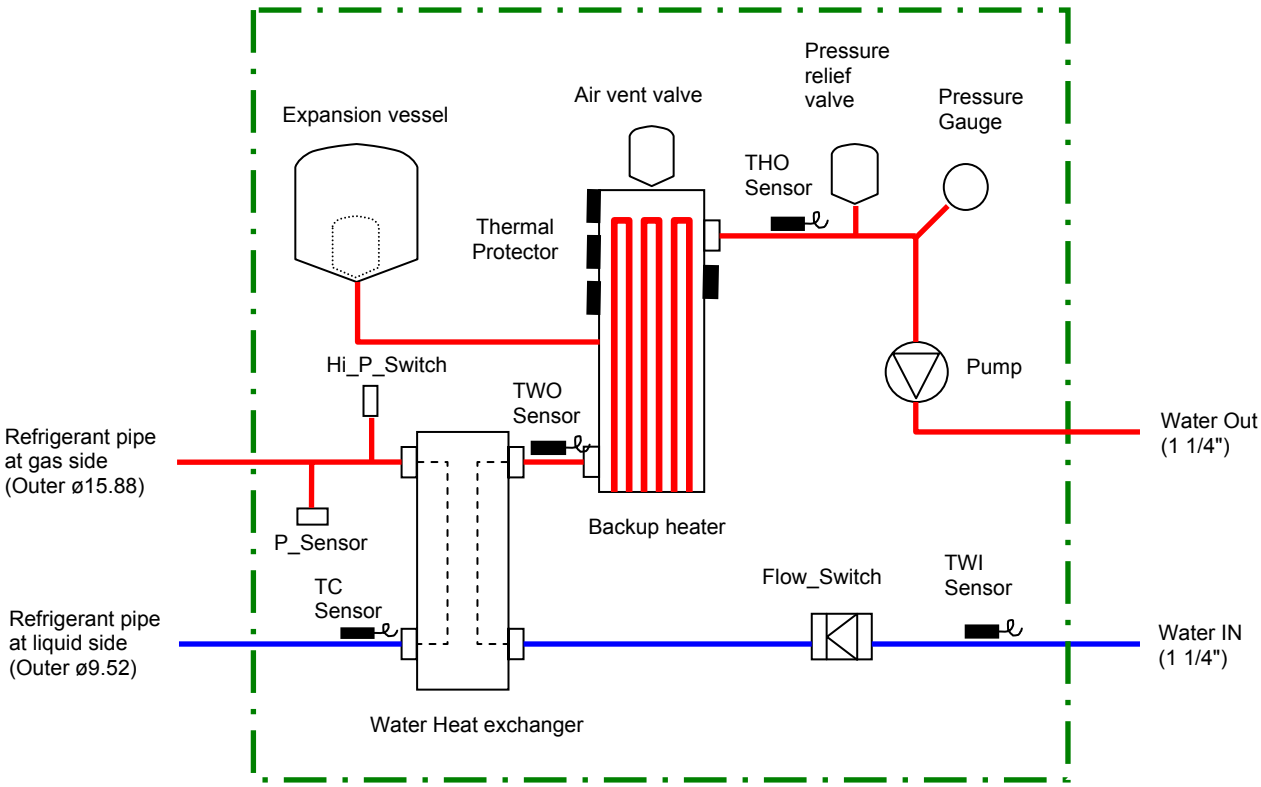
H: Max. ±30 m (above or below)
L: Max. 30 m

Note

The maximum pipe length cannot be increased using additional refrigerant.

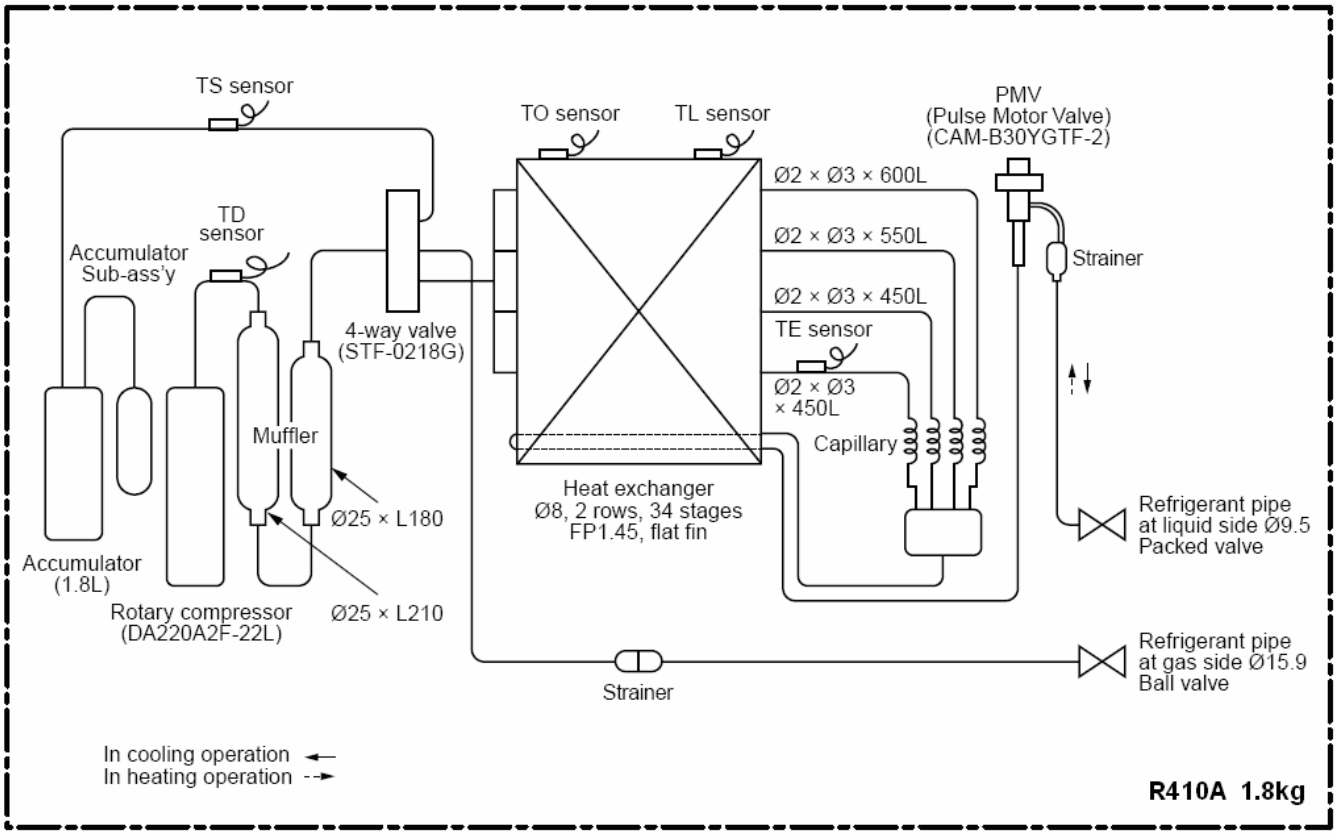
Refrigeration and Water Cycle Diagrams

Hydro Unit

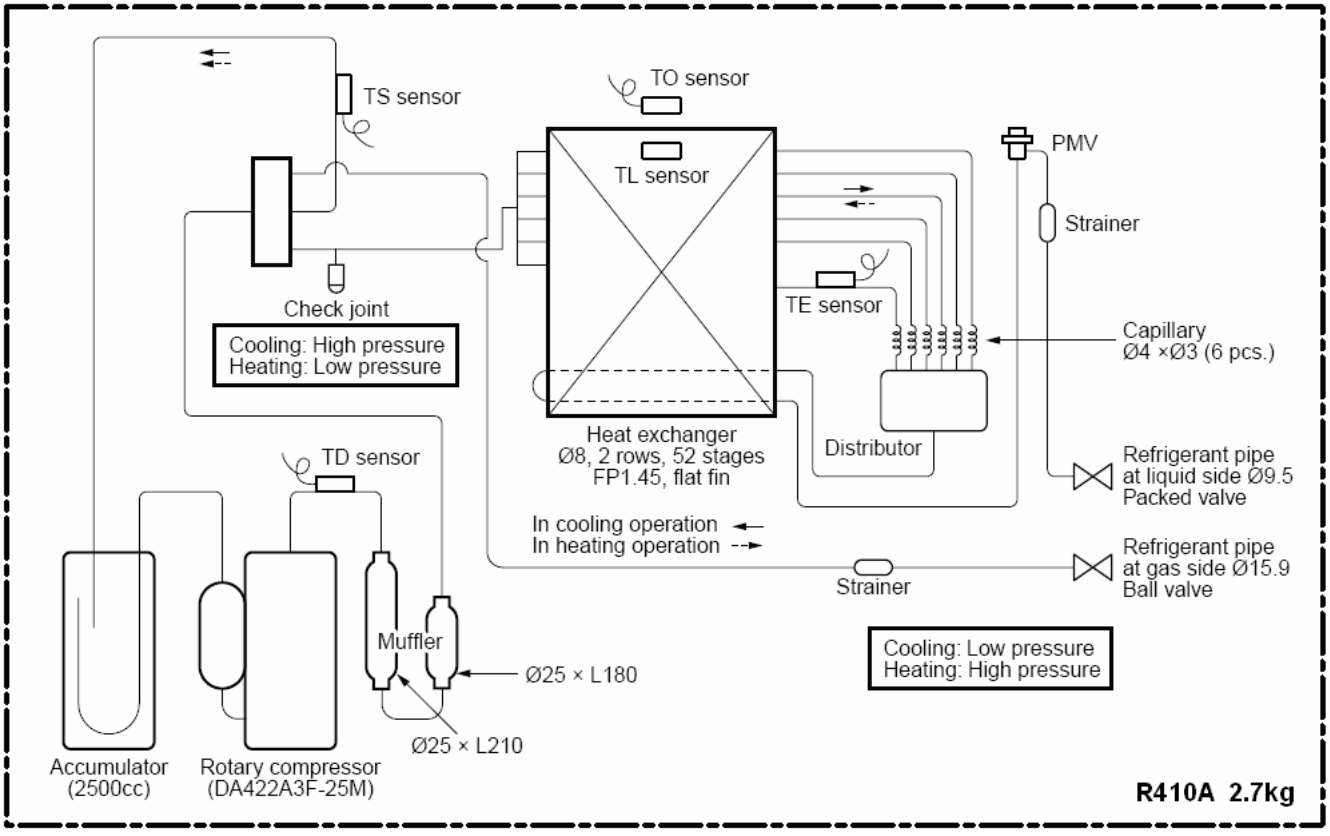


Outdoor Unit

HWS-802H-E



HWS-1102H-E, 1402H-E

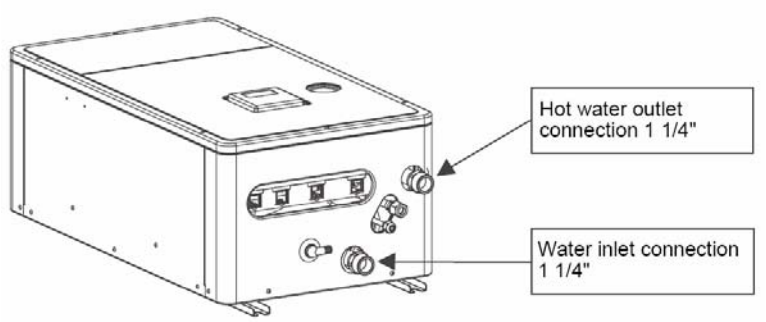


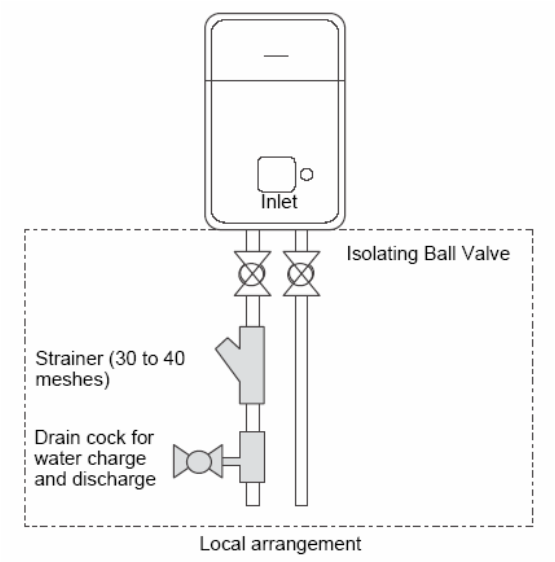
Water Piping

• Install water pipes according to the regulations of respective countries.
• Install water pipes in a freeze-free place.
• Make sure that water pipes have sufficient pressure resistance (The setting value of the pressure relief valve is 0.3 MPa).
• Do not use zinc plated water pipes. When steel pipes are used, insulate both ends of the pipes.

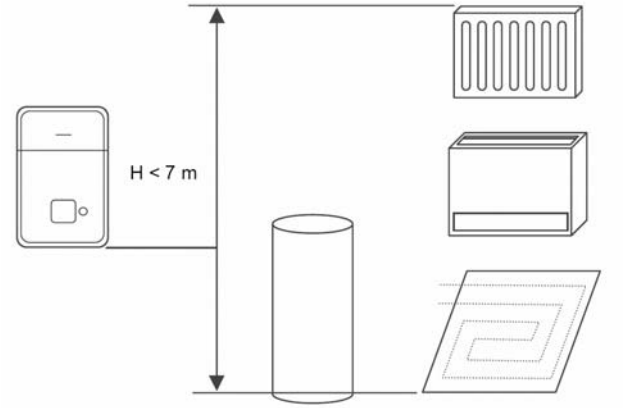
Water Connections

• Install a strainer with 30 to 40 meshes (procure locally) at the water inlet of the Hydro Unit.
• Install drain cocks (procure locally) for water charge and discharge at the lower part of the Hydro Unit.





Water Piping Limitations

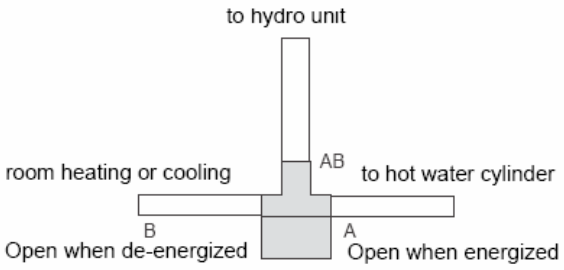


Design the water pipe length within the QH characteristics of the pump (flow-rate and pump head).

The maximum height difference for the water pipes is 7 metres.

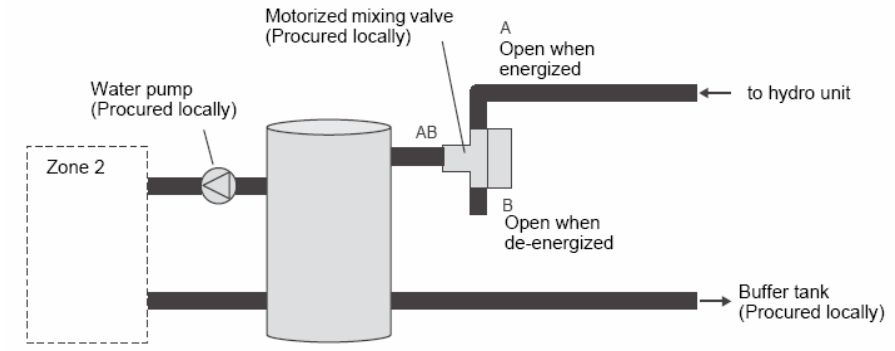
Piping to hot water tank (option)

Water supplied to the hot water cylinder is branched by a motorized 3-way valve (procured locally).
Connect the hot water cylinder to port A (open when energized) of the valve.



Piping to 2-zone operation (option)

To perform 2-zone temperature control circulate water using another pump (procured locally) through a motorized mixing valve (procured locally) and a buffer tank (procured locally).



Checking water volume and initial pressure of expansion vessel

The expansion vessel of the Hydro Unit has a capacity of 12 litres.
The initial pressure of the expansion vessel is 0.1 MPa (1 bar).
The suggested initial water charge is 0.2MPa (2 bar).
The pressure of the safety valve is 0.3 MPa (3 bar).
Verify whether the capacity of the expansion vessel is sufficient using the following expression. If the volume is insufficient, install an appropriate external expansion vessel.

$$V = \frac{\varepsilon \times Vs}{1 - \frac{P1}{P2}}$$

V	Action
< 12 L	Internal Expansion Vessel Size OK
> 12 L	Internal Expansion Vessel Size too small. Install appropriate external expansion vessel

V: Necessary total vessel capacity (L)
Ɛ: Water expansion coefficient at average hot water temperature
Vs: Total water volume in the closed system (Do not include Hot Water Cylinder)
P1: System pressure at tank setting position (Mpa_abs*).
(Pipe inner pressure during pump operation before heating device operates = water supply pressure)
P2: Maximum pressure used during operation at tank setting position (MPa_abs*).
(= safety valve setting pressure)

* The absolute pressure value (abs.) is obtained by adding the atmospheric pressure (0.1 MPa (1 bar)) to the gauge pressure.

Water temperature and expansion coefficient (Ɛ)	
Hot water temperature (°C)	**Expansion rate** (Ɛ)
0	0.0002
4	0.0000
5	0.0000
10	0.0003
15	0.0008
20	0.0017
25	0.0029
30	0.0043
35	0.0050
40	0.0078
45	0.0100

Water temperature and expansion coefficient (Ɛ)	
Hot water temperature (°C)	**Expansion rate** (Ɛ)
50	0.0121
55	0.0145
60	0.0171
65	0.0198
70	0.0229
75	0.0258
80	0.0292
85	0.0324
90	0.0961
95	0.0967
-	-

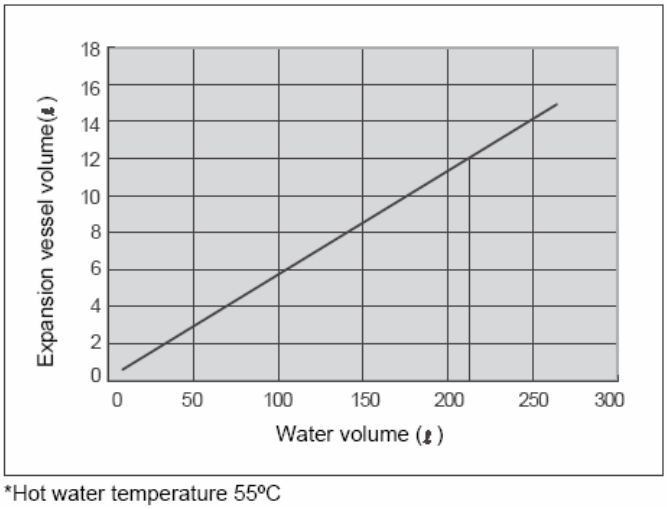
Example

Maximum Hot Water temperature: 55°C, initial water charge: 0.2MPa and system volume: 200 L.

The calculated Vessel capacity (V) is 11.6 L:-

$$11.6 = \frac{0.0145 \times 200}{1 - \frac{(0.2+0.1)}{(0.3+0.1)}}$$

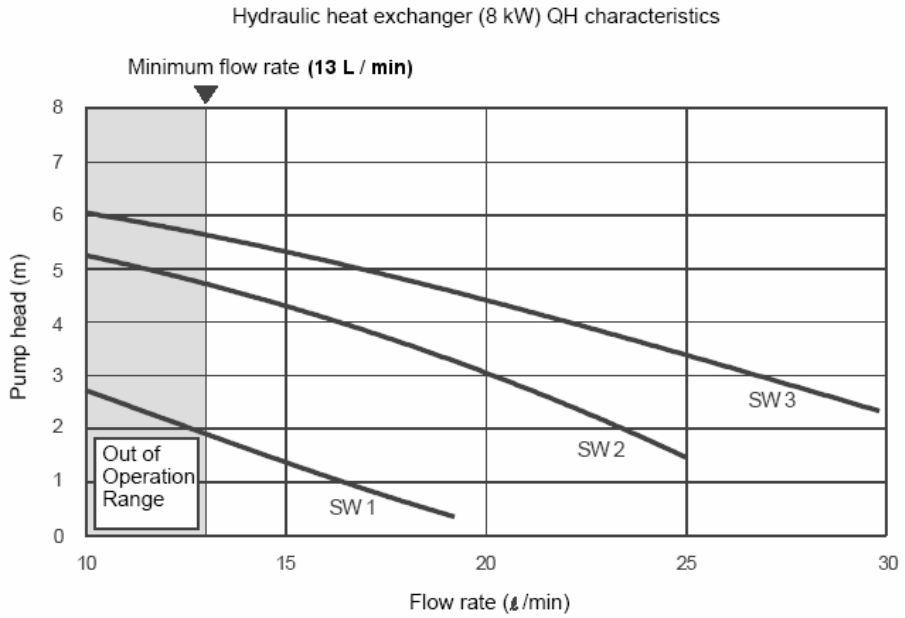
In this case V < 12 L therefore the internal expansion vessel is sufficient.
There is no need to install an external expansion vessel.

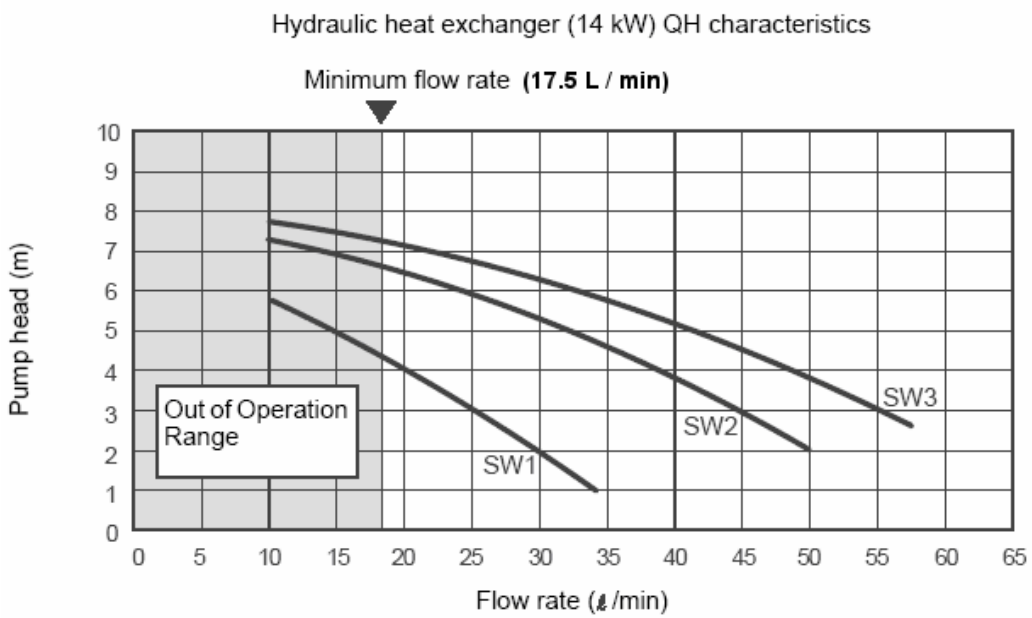


*Hot water temperature 55ºC

Pump operation / configuration

Change Pump speed, so that water flow is always greater than the minimum flow rate. If water flow is lower than the minimum rate during operation, the unit detects error.

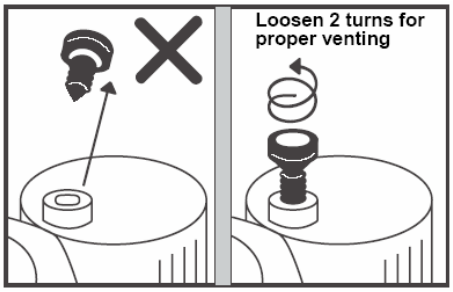




Water charging

Charge water until the pressure gauge shows 0.2 MPa (2 bar).
Hydraulic pressure may drop when the trial run begins. In that case, add water.

Air may enter if the charged hydraulic pressure is low.
Loosen the purge valve cap by two turns to release air.
Loosen the cap of the pressure relief valve to release air.
Water may come out of the pressure relief valve.
Release the air completely from the water circuit. Failure to do so may disable correct operation.



Water quality

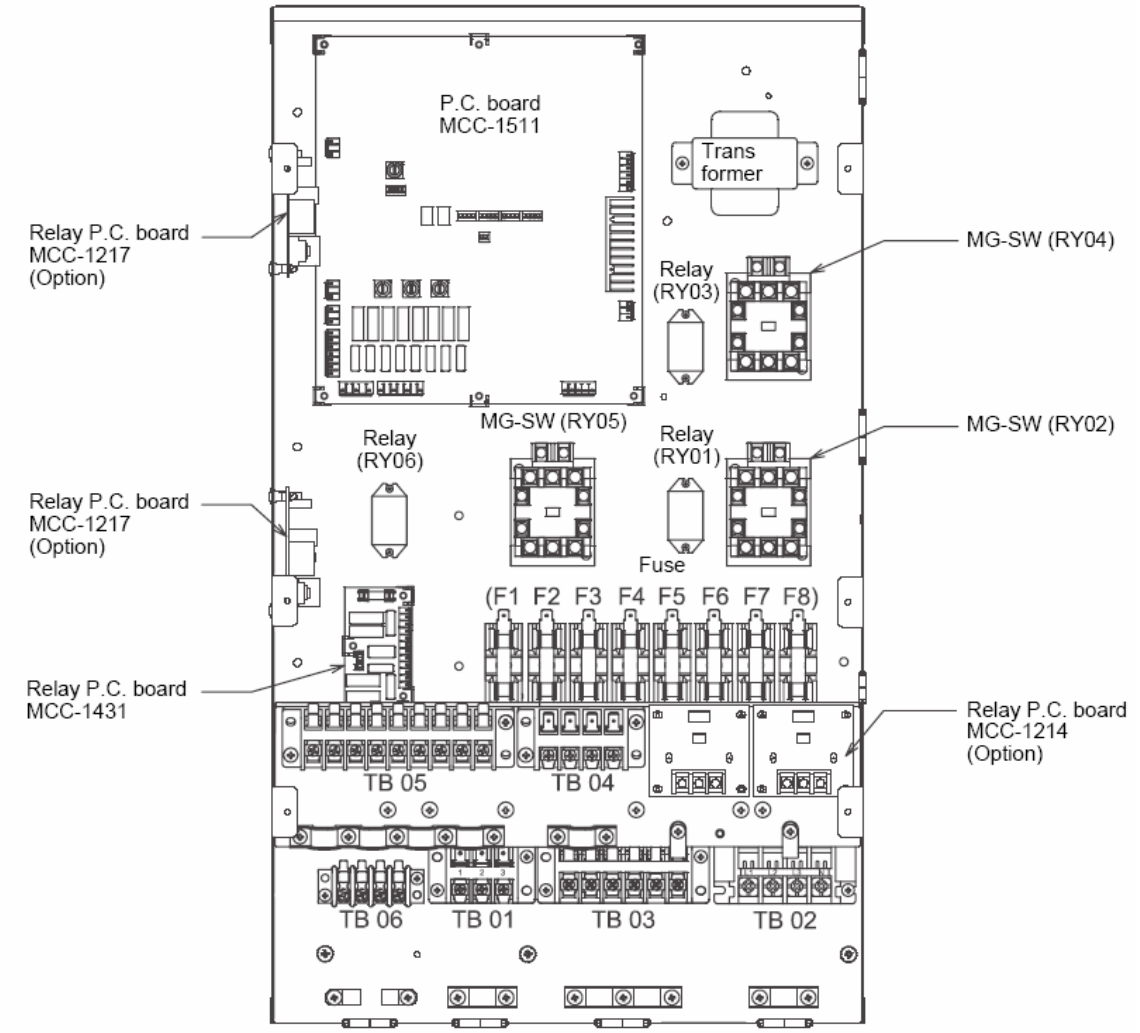
The water used must satisfy EN directive 98/83 EC.

Piping insulation

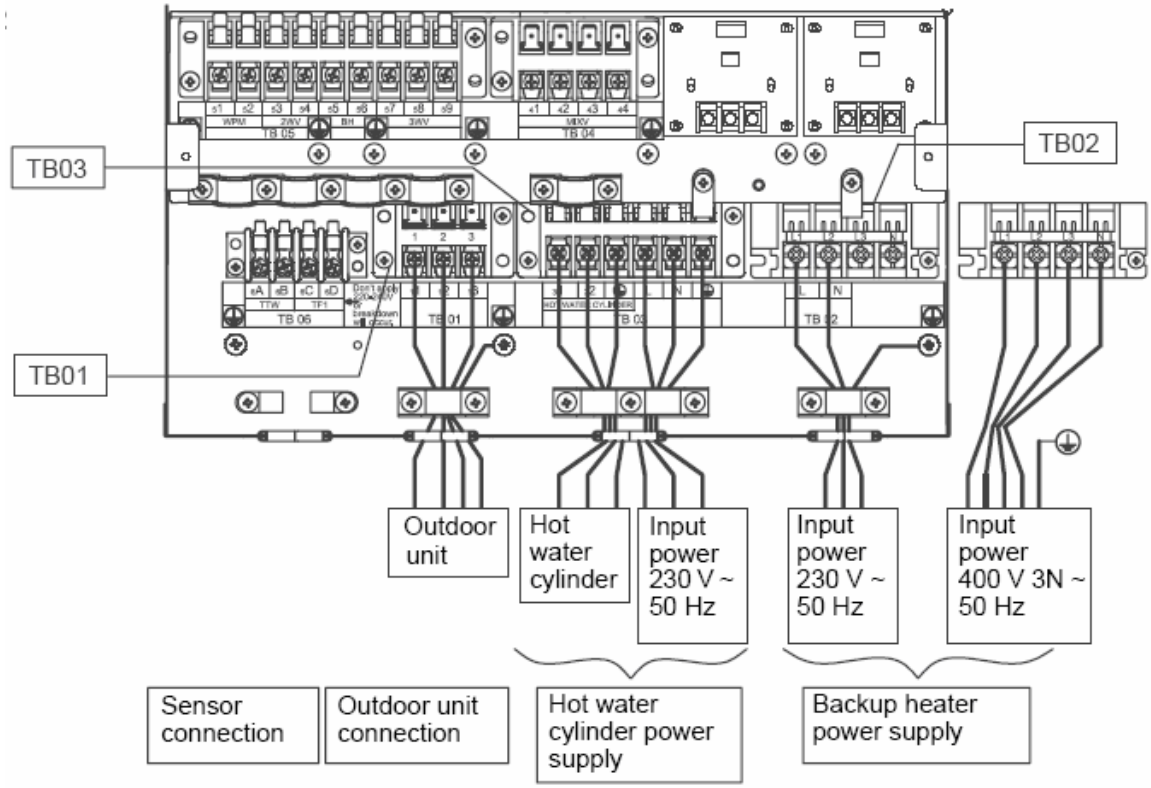
It is recommended that insulation treatment be applied to all pipes. To perform optional cooling operation, apply insulation treatment of 20 t or more to all pipes.

Electrical Connections

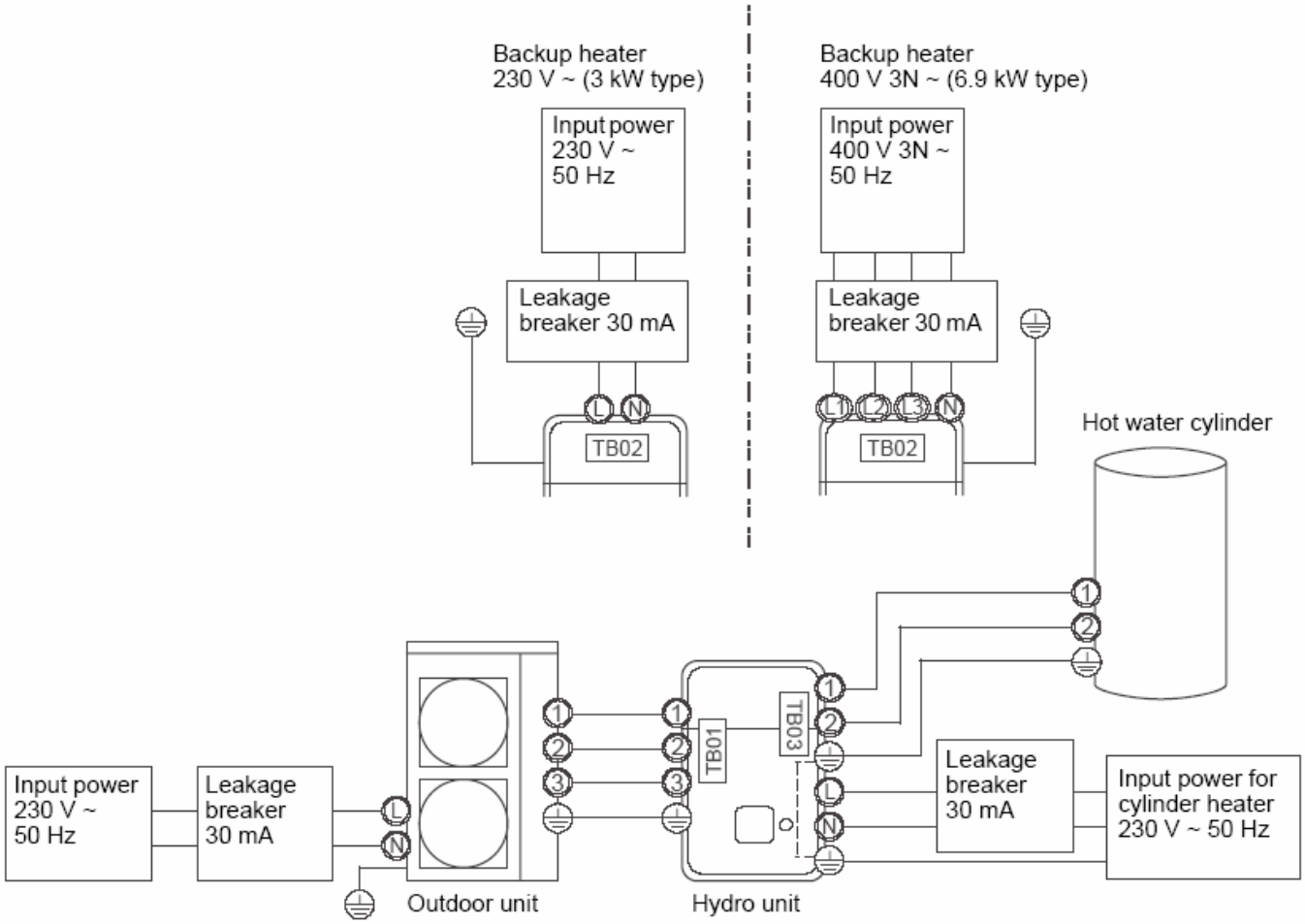
E Box layout



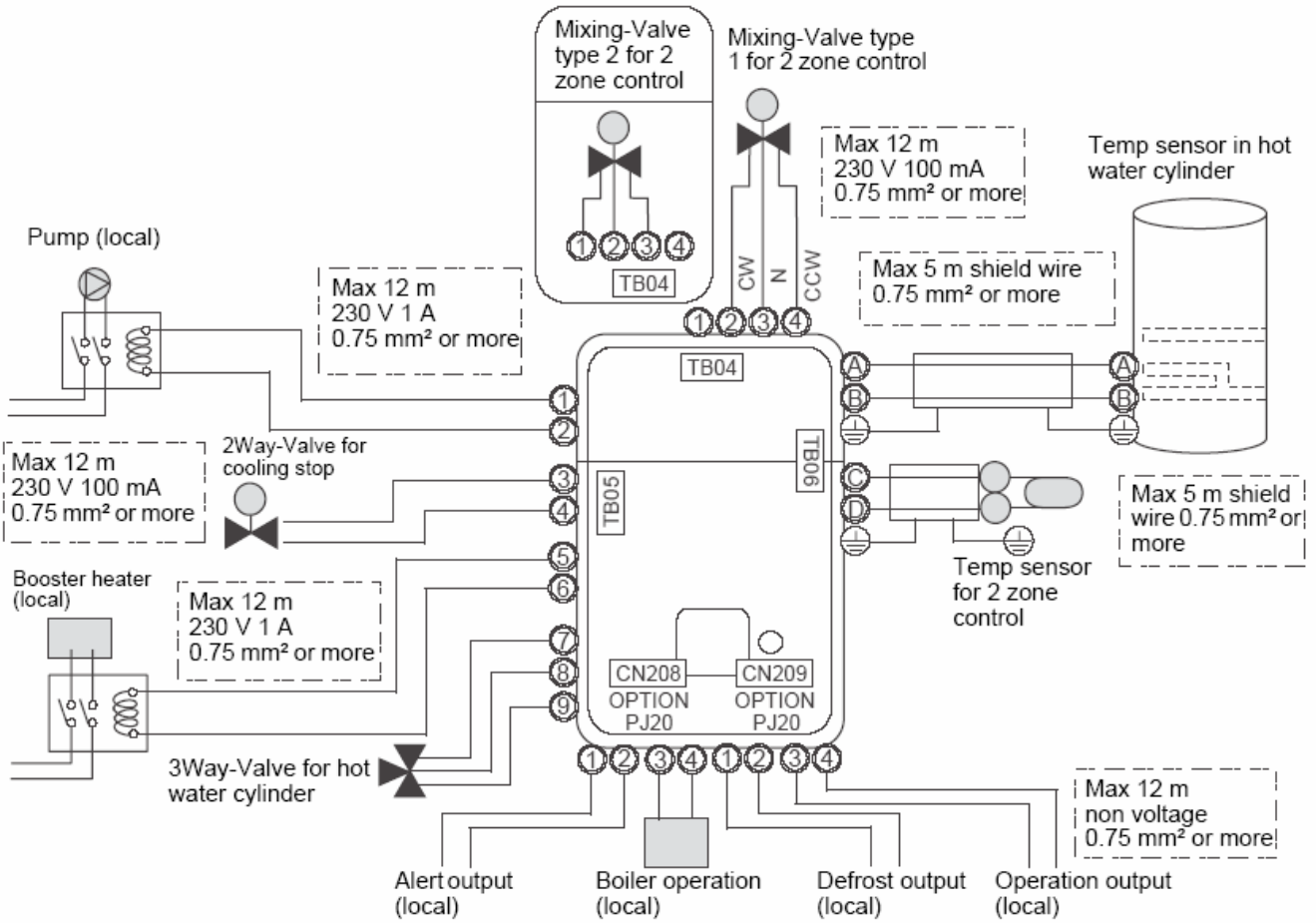
Terminal Block Connections



Power Lines Schematic



Control Lines Schematic



Electrical supply / cable specifications

Wiring specifications (power line)

Description		POWER SUPPLY	Maximum current	Installation fuse rating	Cable size	Connection destination
Outdoor unit power	14 kW	230 V ~ 50 Hz	22.8 A	25 A	2.5 mm² or more	Ⓛ , Ⓝ
	11 kW	230 V ~ 50 Hz	22.8 A	25 A	2.5 mm² or more	
	8 kW	230 V ~ 50 Hz	20.8 A	25 A	2.5 mm² or more	
Outdoor-Hydro		–		–	1.5 mm² or more	① , ② , ③
Hydro inlet heater power	3 kW	230 V ~ 50 Hz	13 A	16 A	1.5 mm² or more	Ⓛ , Ⓝ (TB02)
	6 kW	400 V 3N ~ 50 Hz	15 A (13 A x 2P)	25 A	2.5 mm² or more	Ⓛ1 , Ⓛ2 , Ⓛ3
	9 kW	400 V 3N ~ 50 Hz	23 A (13 A x 3P)	25 A	2.5 mm² or more	Ⓝ (TB02)
Hydro cylinder heater power		230 V ~ 50 Hz	12 A	16 A	1.5 mm² or more	Ⓛ , Ⓝ (TB03)
Hydro - cylinder		–	12 A	–	1.5 mm² or more	① , ② (TB03)

Wiring specification (control line)

Description	Line spec	Maximum current	Maximum length	Cable Size	Connection destination
3-way valve control	2 line or 3 line	100 mA	12 m	0.75 mm² or more	⑦ , ⑧ , ⑨ (TB05)
Mixing valve control	3 line	100 mA	12 m	0.75 mm² or more	① , ② , ③ or ② , ③ , ④ (TB04)
2-zone thermo sensor	2 line	100 mA	5 m	0.75 mm² or more	Ⓒ , Ⓓ (TB06)
Cylinder thermo sensor	2+GND (shield wire)	100 mA	5 m	0.75 mm² or more	Ⓐ , Ⓑ (TB06)
Second remote controller	2 line	50 mA	50 m	0.75 mm² or more	① , ② (TB07)

Control parts specifications

Description	Power	Maximum current	Type
Motorized 3-way valve (for hot water)	AC 230 V	100 mA	Spring return type Note: 3-wire SPST and SPDT type can be used by changing the function code.
Motorized 2-way valve (for cooling)	AC 230 V	100 mA	spring return type (normally open)
Motorized mixing valve type 1 (for 2-zone)	AC 230 V	100 mA	60 sec 90º. SPDT type Note: SPST and 20 to 240 sec type can be used by changing the function code.

Output line specifications

Description	Output	Maximum current	Max voltage	Maximum length	
External pump No. 1	AC230V	1 A	–	12 m	Interlocked with the Hydro Unit pump
External booster heater	AC230V	1 A	–	12 m	Output as required when outdoor air temperature is -20°C or less
Boiler control	Non-voltage contacts	0.5 A	AC230 V	12 m	Output as required when outdoor air temperature is -10°C or less
		1 A	DC24 V	12 m	
ALARM Output	Non-voltage contacts	0.5 A	AC230 V	12 m	
		1 A	DC24 V	12 m	
Operation Output	Non-voltage contacts	0.5 A	AC230 V	12 m	
		1 A	DC24 V	12 m	
Defrost Output	Non-voltage contacts	0.5 A	AC230 V	12 m	
		1 A	DC24 V	12 m	

Input line specifications

Description	Input	Maximum length
Emergency stop control	Non-voltage	12 m
Cylinder thermostat input	Non-voltage	12 m
Cooling thermostat input	Non-voltage	12 m
Heating thermostat input	Non-voltage	12 m

⚠CAUTION

Earthing arrangements

The Hydro Unit and related equipment must be earthed in accordance with your local and national electrical regulations.

It is essential that the equipment is earthed to prevent the electric shock and damage to the equipment.

Electrical connection to hydro unit

• Remove the front cover and the electrical box cover from the Hydro Unit.

• The Hydro Unit power cable must be sized in accordance with refer to “Electrical supply/cable specifications”.

• Connect the Hydro Unit power cable to Terminal 02 as shown below.

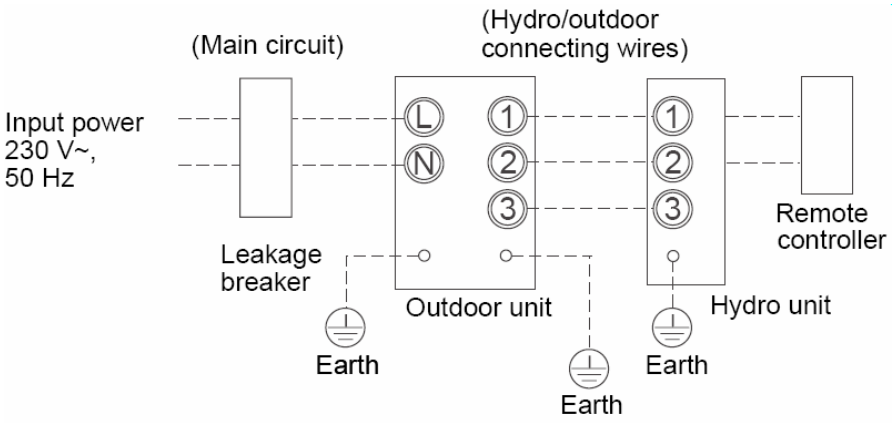
Single Phase Units: Live conductor – Terminal L1
Neutral conductor – Terminal L2
Earth conductor – Earth terminal

Three Phase Units: Phase 1 conductor – Terminal L1
Phase 2 conductor – Terminal L2
Phase 3 conductor – Terminal L3
Neutral conductor – Terminal N
Earth conductor – Earth

• Ensure the Hydro Unit power cable is secured using the cable clamp fitted in the electrical box.

• Ensure the Hydro Unit power cable connection terminals are tight.

Outdoor unit to hydro unit electrical connection



• Ensure electrical circuits are isolated before commencing work.

• The Outdoor Unit to Hydro Unit interconnecting cable must be sized in accordance with refer to “Electrical supply/cable specifications”.

• Connect the Outdoor Unit to Hydro Unit interconnecting cable as shown in the diagram above.

• Ensure the Outdoor Unit to Hydro Unit interconnecting cable is secured using the cable clamp fitted in the electrical box.

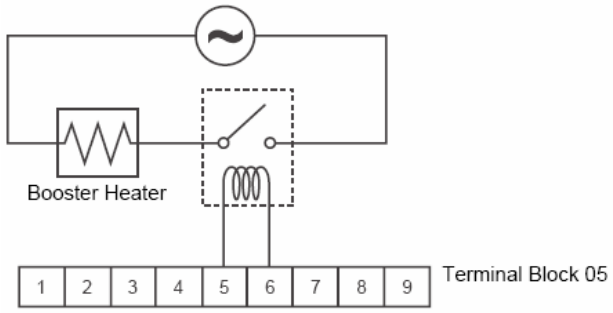
• Ensure the Outdoor Unit to Hydro Unit interconnecting cable connection terminals are tight.

Electrical connection for external booster heater

⚠CAUTION

The maximum current available from the booster heater output is 1 A. Do not connect the booster heater directly to Terminal Block 05 on the Hydro Unit. The AC230 V 1 A output from the Hydro Unit must only be used to energize an external contactor (Supplied locally).

• The booster heater can be installed only for room heating and cannot be used for hot water supply.
• Install the booster heater downstream of the 3-way valve on the indoor unit side.
• The booster heater is an external heater, supplied locally, used to assist the Hydro Unit during low ambient conditions.
• The output from the Hydro Unit is only enabled when the outdoor air temperature is less than -20°C.
• Ensure the external booster heater is installed and set up in accordance with all Local, National and International regulations.
• Connect the coil, of the field supplied contactor, to terminals 5 & 6 on Terminal Block 05. The contactor will energize in the event of low ambient conditions.
• A separate dedicated electrical supply must be used for the external booster heater. This must be connected through the contacts on the field supplied contactor (see diagram below):-

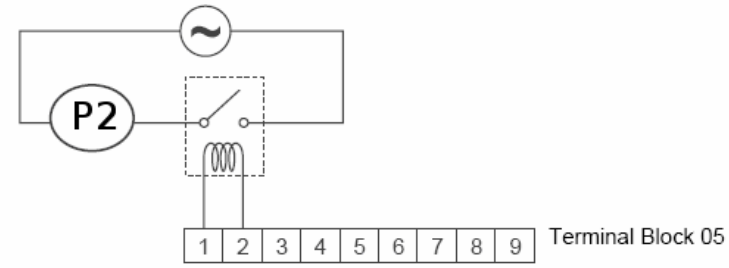


Electrical connection for external additional pump (P2)

⚠CAUTION

The maximum current available from the additional pump output is 1 A. Do not connect the additional pump directly to Terminal Block 05 on the Hydro Unit. The AC230 V 1 A output from the Hydro Unit must only be used to energize an external contactor (Supplied locally).

• The Hydro Unit has the facility to connect an additional circulating pump, if required, into the heating or cooling system.
• Install the external pump so that its motive power does not affect the internal pump.
• The output for the pump is synchronized with the operation of the main circulating pump (P1) inside the Hydro Unit.
• Connect the coil, of the field supply contactor, to terminals 1 & 2 on Terminal Block 05.
• A separate dedicated electrical supply must be used for the additional pump. This must be connected through the contacts on the field supplied contactor (see diagram below):-



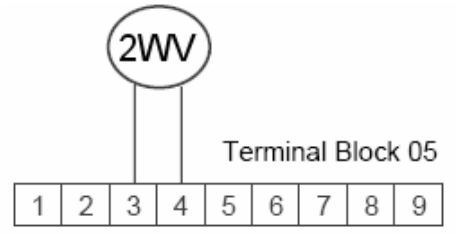
2-way valve (for cooling) connection

Required Valve Specification:

Electrical Specification: 230 V; 50 Hz; <100 mA
Return Mechanism: 2-wire spring return.

• The Hydro Unit has the facility to connect a 2-way valve to isolate Space Conditioning Units that do not perform cooling, when Cooling Mode is selected.

• Connect the 2-way valve in accordance with the diagram (opposite):-



3-way valve (diverter) connection

Required Valve Specification:

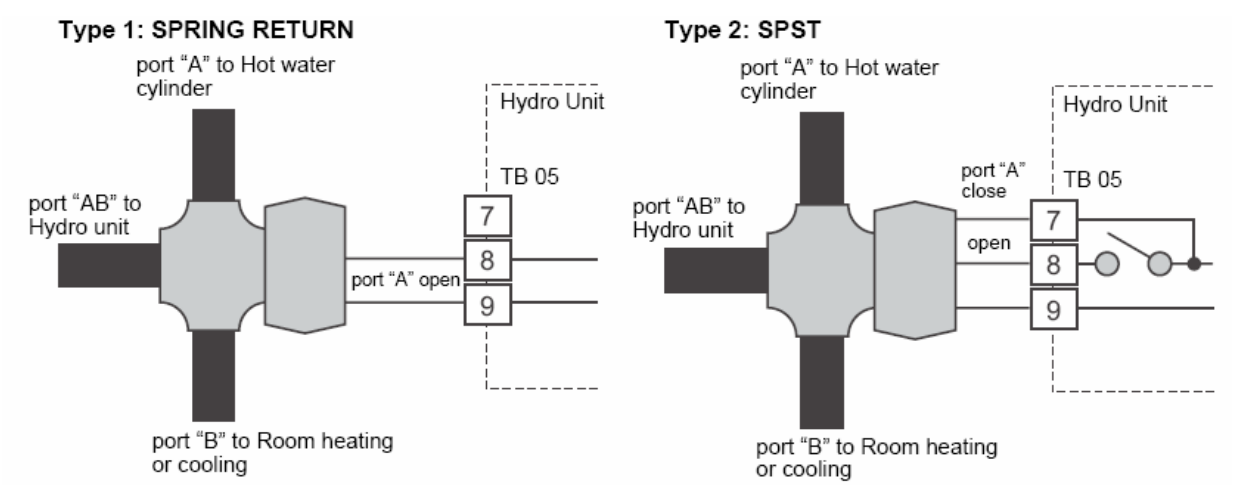
Electrical Specification: 230 V; 50 Hz; <100 mA
Valve Diameters: Port A, Port B: Ø 1 1/4"
Return Mechanism: 3 types of 3-way valve (diverter) can be used.
Set the 3-way valve in use with the DIP switch SW13-1 on the Hydro Unit board.

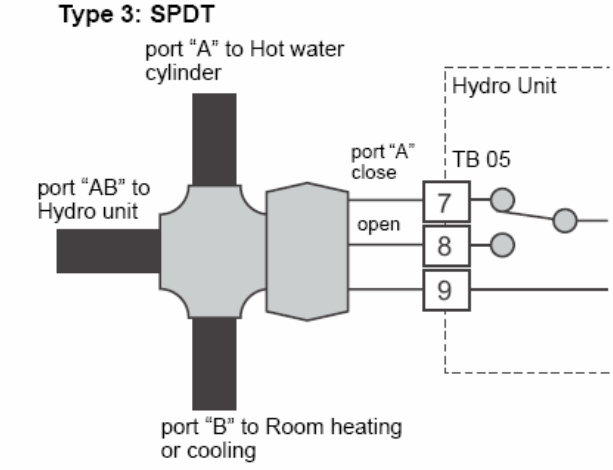
Diverter Valve	Description	SW13-1
Type 1	2-wire spring return	OFF
Type 2	3-wire SPST	OFF
Type 3	3-wire SPDT	ON

Continuous operation of the valve motor at the fully open position is not recommended.

• The 3-way diverter valve is used to select either domestic hot water or space heating.

• Connect the 3-way diverter valve in accordance with the diagram below:-





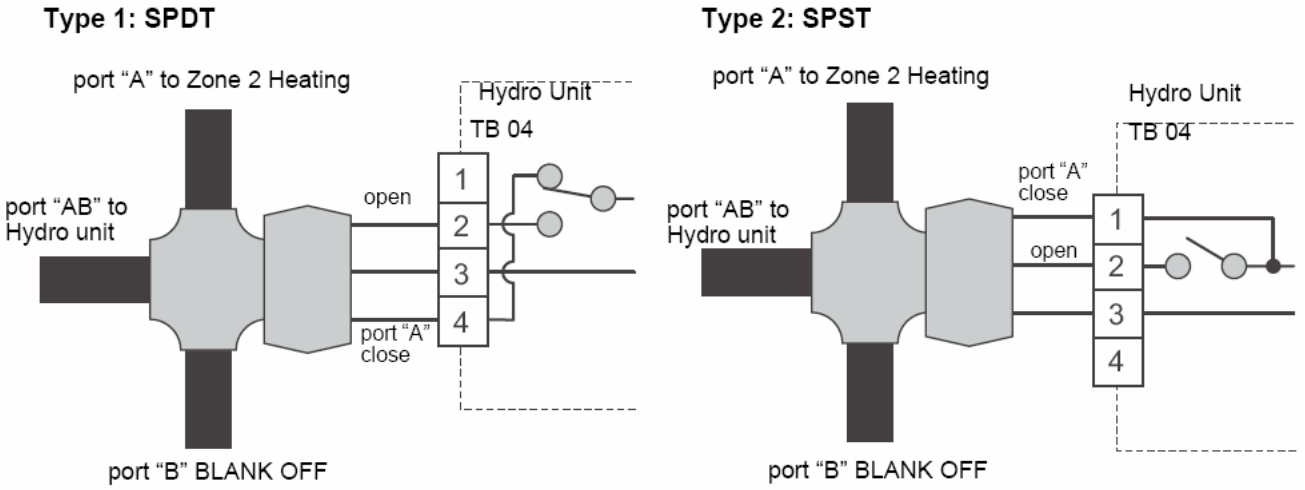
3-way mixing valve connection

Required Actuator Specification

Electrical Specification:230 V; 50 Hz; <100 mA

The 3-way mixing valve is used to achieve the temperature differential needed in a 2-zone heating system.

• Connect the 3-way mixing valve in accordance with the diagrams below:-



Hot water cylinder connection (optional)

• Please refer to "Electrical supply/cable specifications" for fuse/cable size and for connection details.

Electrical Connection (Hot Water Cylinder Electric Heater)

• The electric heater, incorporated in the hot water cylinder, requires a separate supply to Hydro Unit.

• Connect the hot water cylinder heater electrical supply in accordance with shown below:

Live conductor: Terminal L on Terminal Block 03

Neutral conductor: Terminal N on Terminal Block 03

Earth Conductor: Earth terminal on Terminal Block 03

• Connect the hot water cylinder heater to the Hydro Unit as shown below:

Live conductor to hot water cylinder: Terminal 1 on Terminal Block 03

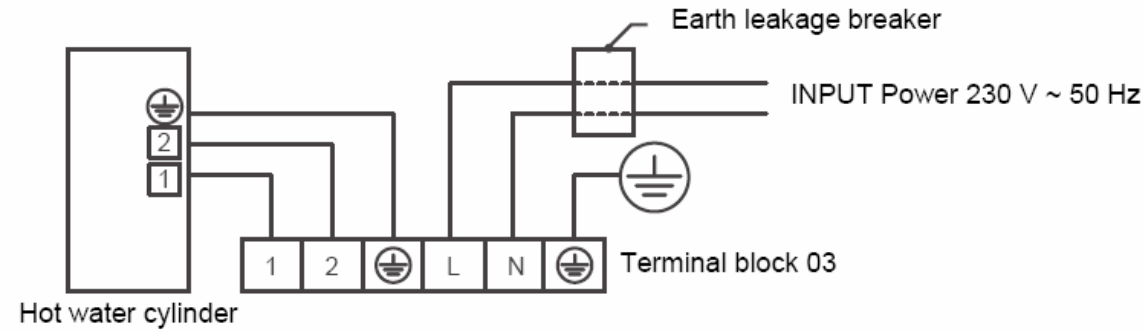
Neutral conductor to hot water cylinder: Terminal 2 on Terminal Block 03

Earth conductor to hot water cylinder: Earth terminal on Terminal Block 03

Electrical Connection (Hot Water Cylinder temperature Sensor)

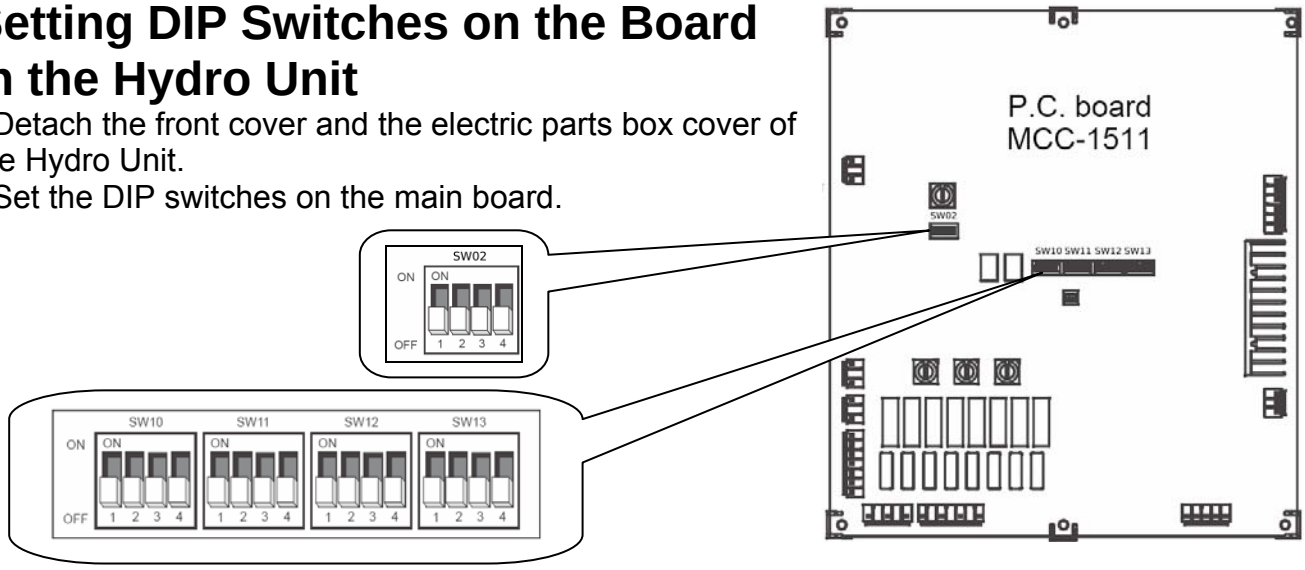
• Connect the hot water cylinder temperature sensor as shown below to terminals A & B on Terminal Block 06 in the Hydro Unit.

• Please ensure that the interconnecting cable, between the Hydro Unit and the hot water cylinder, is connected to earth at both ends of the cable using the shield wire.



Setting DIP Switches on the Board in the Hydro Unit

• Detach the front cover and the electric parts box cover of the Hydro Unit.
• Set the DIP switches on the main board.



SW10	Description	Switch mode			
		Default setting		Alternate	
1	Internal pump P1 operating mode	Continuous operation	OFF	ON	HP synchronized
3	External P2 pump operation	Continuous operation	OFF	ON	Interlocked with the internal pump synchronized with P1.

SW11	Description	Switch mode			
		Default setting		Alternate	
1	Internal backup heater operation	Operate	OFF	ON	Not operate
2	Hot water cylinder heater operation	Operate	OFF	ON	Not operate
3	Booster heater operation	Operate	OFF	ON	Not operate

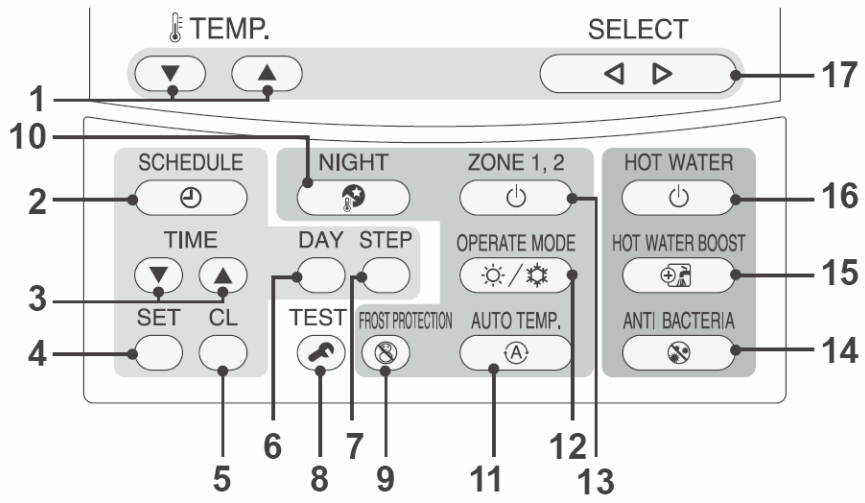
SW12	Description	Switch mode			
		Default setting		Alternate	
1	Hot water supply operation	Valid	OFF	ON	Invalid
2	Zone 1 operation	Valid	OFF	ON	Invalid
3	Zone 2 operation	Invalid	OFF	ON	Valid

SW13	Description	Switch mode			
		Default setting		Alternate	
1	Type of motorized 3-way valve	• 2-wire spring return type • 3-wire SPST type	OFF	ON	3-wire SPDT type
2	Interlocking with boiler	Invalid	OFF	ON	Valid
3	Auto restart for power failure	Auto restart	OFF	ON	Manual restart

SW02	Description	Switch mode			
		Default setting		Alternate	
4	Room thermostat	Invalid	OFF	ON	Valid

Hydro Unit Remote Control

Buttons and Functions

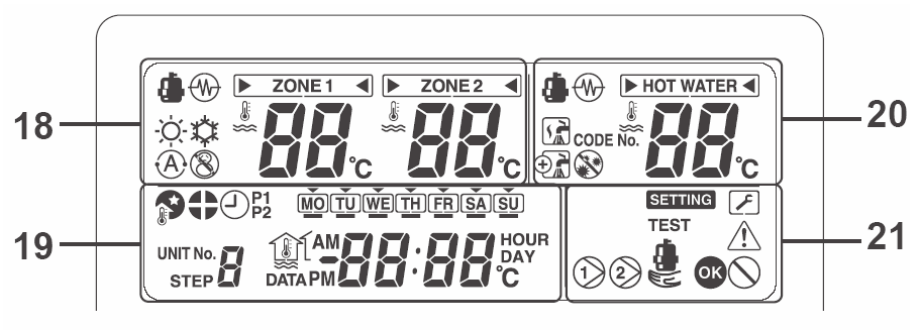


1. TEMP. button: ▼ ▲	Changes the set temperature for each operation mode (ZONE1/2 hot water) by 1°C step.	**10. NIGHT button:**	Controls the night set back operation.
2. SCHEDULE button:	Sets the current time and scheduled weekly operation.	**11. AUTO TEMP. button:**	Switches setting temperature automatically according to outside temperature. (Pressing this button long changes the mode to data setting mode).
3. TIME button: ▼ ▲	Changes time for current time setting and scheduled weekly operation setting with ▼ and ▲ buttons.	**12. OPERATE MODE button:**	Selects ZONE1/2 operation mode (heating or cooling).
4. SET button: SET	Determines the entered current time setting and scheduled weekly operation setting.	**13. ZONE1, 2 button:** ZONE 1, 2	Turns on/off the zone (floor heating/radiator/FCU) operation.
5. CL button: CL	Clears settings for the current time and scheduled weekly operation.	**14. ANTI BACTERIA button:**	Regularly increases the hot water temperature in the tank for sterilization. (Pressing this button long changes the mode to data setting mode).
6. DAY button: DAY	Sets days of the week for current time setting and scheduled weekly operation setting.	**15. HOT WATER BOOST button:**	Boosts boiling when high tapping temperature is required temporarily.
7. STEP button: STEP	Specifies switching STEP number in a day for weekly schedule.	**16. HOT WATER button:** HOT WATER	Turns on/off hot water operation.
8. TEST button:	Used for test run or service.	**17. SELECT button:** ◁ ▷	Selects an operation mode when changing the set temperature of each operation mode.
9. FROST PROTECTION button:	Controls minimum operation for unused period (going out, absence,etc.) for anti freezing.		

NOTE

Some functions are not provided depending on the system specification in use.

Display Explanation



18: ZONE1, ZONE2	
Display	**Description**
ZONE 1	Lights when floor heater or radiator is connected (when the system has floor heater or radiator).
▶ ZONE 1 ◀	ZONE1 selected for Temperature to be changed.
ZONE 2	Lights when system configured to have 2 zones.
▶ ZONE 2 ◀	ZONE2 selected for Temperature to be changed.
	Lights during heating or cooling operation using the heat pump.
	Lights when the internal heater is energized during heating operation.
	Lights when heating is selected.
	Lights when cooling is selected.
	Lights when the FROST PROTECTION button is pressed and goes out when the button is pressed again.
	Lights when Auto operation is selected.
88	Displays heating/cooling set temperature. (Heating: 20 to 55°C, factory setting: Auto, cooling: 10 to 30°C) Goes out when Auto operation is selected.
°C	Lights when the set temperature or sensor's water temperature is displayed with the 7-segment indicator.

20: HOT WATER	
Display	**Description**
HOT WATER	Lights when hot water supply system is connected (when the system has hot water supply).
▶ HOT WATER ◀	HOT WATER selected for Temperature to be changed.
	Lights when hot water supply operation is performed by heat pump.
	Lights when the internal heater is energized during hot water supply operation.
	Lights during hot water supply operation.
	Lights while hot water boost is activated.
	Lights when the ANTI BACTERIA button is pressed and goes out when the button is pressed again.
CODE No.	Lights when unit enters the data set mode.
88	Displays hot water set temperature. (40 to 80°C, factory setting: 65°C)
°C	Lights when the set temperature or sensor's water temperature is displayed with the 7-segment indicator.

Display Explanation (cont.)

19: TIMER	
Display	**Description**
AM PM 88:88	Clock: Displays the current time (AM or PM).
MO TU	Displays days of the week (Sunday to Saturday).
	Lights when the NIGHT button is pressed and goes out when the button is pressed again.
	Lights when night time quiet operation is set.
P1	Indicates scheduled operation 1 status (including setting time).
STEP 8	Displays the scheduled operation step when the scheduled operation STEP1-5 program is set.
	Lights during time setting and scheduled operation setting.

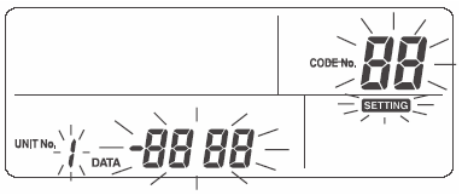
21: OPERATION	
Display	**Description**
1 2	Lights while internal pump (P1) or external pump (P2) is driven.
	Lights during backup operation only by the heater.
SETTING	Lights when the unit enters the data set mode and goes out when the unit exits the data set mode.
	Lights when the unit enters the service mode and goes out when the unit exits the service mode.
	Lights when an error occurs and goes out when the error is cleared.
OK	Lights for two seconds when settings are completed.
	Lights for two seconds when settings failed.

Function Code Access

Set function codes for various operation modes, input using the remote controller.
There are 2 types of settings:-
1) Hydro Unit function code setting.
2) Remote controller function code setting.

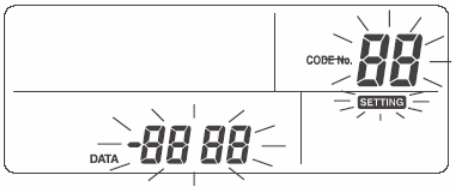
Setting procedure for Hydro Unit function code

1. Press the TEST + SET + SELECT buttons for four seconds or more to enter the hydro unit function code setting mode.
2. Set the function code number with the TEMP. buttons (CODE No.: 01 to 91).
3. Set data (DATA) with the TIME buttons.
4. Press the SET button to confirm the settings.
5. The CL button is enabled only before the SET button is pressed and the function code is changed.
6. Press the TEST button to finish the settings.



Setting procedure for Remote Controller function code

1. Press the TEST + CL + TEMP. ▼ buttons for four seconds or more to enter the remote controller function code setting mode.
2. Set the function code number with the TEMP. buttons (CODE No.: 01 to 13).
3. Set data (DATA) with the TIME buttons.
4. Press the SET button to determine the settings.
5. The CL button is enabled only before the SET button is pressed and the function code is changed.
6. Press the TEST button to end the settings.



Main setting items

(1) Setting Hot Water Temperature Range (function code 18 to 1F)
• Set the temperature range for heating (zone 1, zone 2), cooling, and hot water.
• The upper-limit and lower-limit temperatures of each mode can be set.

(2) Setting Heat Pump Operation Conditions for Hot Water Supply (function code 20 and 21)
• Set the heat pump start water temperature and heat pump stop water temperature.
• The heat pump starts working when the water temperature lowers below the set start water temperature. It is recommended that the default value be used.

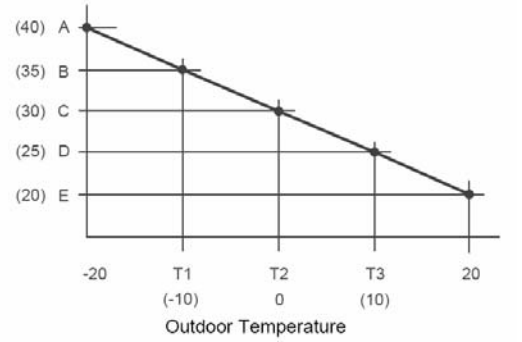
(3) Compensating Hot Water Temperature (function code 24 and 25)
• Compensate the target temperature from the remote controller set temperature when the hot water temperature lowers below the set outside air temperature.

(4) Setting Hot Water Boost (function code 08 and 09)
• Set the control time and target temperature when the HOT WATER BOOST button on the remote controller is pressed.

(5) Setting Anti-Bacteria
• Set the control for the hot water cylinder when ANTI BACTERIA is set with the remote controller.
• Set the target temperature, control period, start time (24-hour notation), and target temperature retention period.
• Make this control setting according to regulations and rules of respective countries.

(6) Setting Priority Mode Temperature
• Set the outside air temperature that changes the preferred operation mode.
• Hot Water - Heating Switching Temperature
Heating operation takes precedence when the temperature lowers the set temperature.
• Boiler HP Switching Temperature
When the temperature lowers the set temperature, the HP operation stops and the external boiler output is made.

(7) Setting Heating Auto Mode Temperature (function code 27 to 31)
• Compensate the target temperature when Auto is set for temperature setting on the remote controller.
• The outside air temperature can be set to one of three points (T1, T2, and T3) within a range of -20 to 20°C.
• The target temperature can be set to a value from 20 to 55°C.
• However, A > B > C > D > E.



• The entire curve can be adjusted plus and minus 5°C by function code 27.

(8) Setting Frost Protection Temperature (function code 3A to 3B)
• Set the function when the FROST PROTECTION button on the remote controller is pressed.
• Set enabling/disabling of this function and the target water temperature.
• If disabling is set, the frost protection operation is not performed even when the FROST PROTECTION button is pressed.

(9) Setting Frequency of Output to Internal Heater (function code 33 to 34)
• The increase/decrease time is used to set the response time.

(10)Setting Night Setback (function code 26. remote controller function code 0F to 11)
• Set the function when the NIGHT button on the remote controller is pressed.
• Set enabling/disabling of this function, reduction temperature, start time, and end time.
• If disabling is set, the night setback operation is not performed even when the NIGHT button is pressed.

Main setting item (cont.)

(11)Setting 2-Way Valve (for Cooling) Operation (function code 3C)
• When using both cooling and heating operations and there is an indoor unit only for heating (such as floor heating), install the 2-way valve and set this function code.

(12)Setting 3-Way Valve Operation (function code 54)
• This setting is not necessary for normal installation. Make this setting to invert the logic circuit in case ports A and B of the 3-way valve are wrongly attached and it cannot be rectified on site.

(13)Mixing valve types and setting
• Set the time period from full close to full open of the 2-zone control mixing valve. Set a value that is 1/10 of the actual time.

(14)Setting Heating/Hot Water Switching when Boiler Is Used (function code 3E)
• When boiler is used, make this setting to operate the Hydro Unit by the instruction from the boiler.

(15)Setting Heat Pump Operating Time for Hot Water Supply Operation
• Set the time period from the start of heat pump run to the start of heater energization at the beginning of hot water supply operation. If a long period is set, it takes long time for heating water.

(16)Setting Cooling ON/OFF
• Set this function when performing cooling operation.

(17)Remote controller time indication
• 24-hour or 12-hour notation is selected for the timer.

(18)Setting Nighttimes Quiet Operation
• Issue an instruction for low-noise mode operation to the outdoor unit. Enabling/disabling of this function, start time, and end time can be set.

(19)Setting Alarm Tone
• The remote controller alarm tone can be set.

Function Code List

	Function	Function Code Number		Range	Default
		Hydro Unit	Remote Controller		
Setting Temperature Range	Zone 1 - heating upper temperature limit °C	1A	-	37 ~55	55
	Zone 1 - heating lower temperature limit °C	1B	-	20 ~ 37	20
	Zone 2 - heating upper limit temperature °C	1C	-	37 ~55	55
	Zone 2 - heating lower limit temperature °C	1D	-	20 ~ 37	20
	Cooling mode - upper temperature limit °C	18	-	18 ~ 30	25
	Cooling mode - lower temperature limit °C	19	-	10 ~ 18	10
	Hot water - upper temperature limit °C	1E	-	50 ~ 75	75
	Hot water - lower temperature limit °C	1F	-	40 ~ 60	40
Hot Water Operation	Heat pump start temperature °C	20	-	20 ~ 45	38
	Heat pump stop temperature °C	21	-	40 ~ 50	45
Hot Water Temperature Compensation	Temperature compensation - start outside air temperature °C	24	-	-20 ~ 10	0
	Compensation temperature °C	25	-	0 ~ 15	3
Hot Water Boost	Operation time x 10 min	08	-	3 ~ 18	6
	Setting temperature °C	09	-	40 ~ 75	75
Anti - Bacteria	Setting temperature °C	0A	-	70 ~ 75	75
	Start cycle (day)	-	0D	0 ~ 10	7
	Start time (hour)	-	0C	0 ~ 23	22
	Operation time (min)	0B	-	0 ~ 60	30
Priority Mode	Hot water and heating switching temperature °C	22	-	-20 ~ 20	0
	Boiler and heat pump switching temperature °C	23	-	-20 ~ 20	-10

Function Code List (cont.)

	Function	Function Code Number		Range	Default
		Hydro Unit	Remote Controller		
Heating Auto Curve Settings	Outside temperature T1 °C	29	-	-15 ~ 0	-10
	Outside temperature T2 °C	-	-	0	0
	Outside air temperature T3 °C	2B	-	0 ~ 15	10
	Setting temperature A at -20 °C	2C	-	20 ~ 55	40
	Setting temperature B at T1°C	2D	-	20 ~ 55	35
	Setting temperature C at T2°C	2E	-	20 ~ 55	30
	Setting temperature D at T3°C	2F	-	20 ~ 55	25
	Setting temperature E at +20°C	30	-	20 ~ 55	20
	Ratio of Zone 2 in Zone 1 Auto mode (%)	31	-	0 ~ 100	80
	Temperature shift of entire Auto curve (°C)	27	-	-5 ~ 5	0
Frost Protection	Function 0 = Valid; 1 = Invalid	3A	-	0 ~ 1	1
	Setting temperature °C	3B	-	8 ~ 20	15
Back Up Heater Control	Back up heater downtime. 0=5min; 1=10min; 2=15min; 3=20min	33	-	0 ~ 3	1
	Back up heater uptime. 0=10min; 1=20min; 2=30min; 3=40min	34	-	0 ~ 3	0
Night Setback	Zone Selection: 0=Zones 1 and Zone 2; 1=Zone 1 Only	58	-	0 ~ 1	0
	Change Setback temperature °C	26	-	3 ~ 20	5
	Start time (hour)	-	0E	0 ~ 23	22
	End time (hour)	-	0F	0 ~ 23	06
Room Temperature Setting	Room temperature control adjustment. 0=Valid; 1=Invalid	-	02	0 ~ 1	0
	Compensation for temperature °C	35	-	1 ~ 5	1
	Downtime Zone B (x 5min)	36	-	1 ~ 24 (5 ~ 120mins)	6
	Uptime Zone C (x5min)	37	-	1 ~ 24 (5 ~ 120mins)	6
2 Way Valve Operation Control	2 way valve activation for cooling. 0=activated during cooling; 1=not activated during cooling	3C	-	0 ~ 1	0
3 Way valve Operation Control	3 way valve activation. 0=activated during hot water operation; 1=not activated during hot water operation	54	-	0 ~ 1	0
2 Zone Mixing Valve Drive Time	Specified Drive Time for Mixing Valve to 90° open (x 10 sec)	0C	-	3 ~ 24	6
Boiler & Heat Pump Synchronisation	Boiler synchronisation with heat pump. 0=synchronised; 1=not synchronised	3E	-	0 ~ 1	0
Maximum Operation Time of Hot Water Heat Pump	Maximum heat pump operation time in hot water operation priority mode (minutes)	07	-	1 ~ 120	30
Cooling Operation	Activate cooling mode. 0=cooling & heating mode; 1=heating mode only	02	-	0 ~ 1	1

Function Code List (cont.)

	Function	Function Code Number		Range	Default
		Hydro Unit	Remote Controller		
Remote Controller Indication	24 hour or 12 hour remote control display. 0=24hr; 1=12hr	-	05	0 ~ 1	0
Outdoor Night Time Low Noise Operation	0 = Function invalid 1 = Function valid	-	09	0 ~ 1	0
	Start time (hour)	-	0A	0 ~ 23	22
	End time (hour)	-	0B	0 ~ 23	06
Alarm Tone	Tone Switching 0: OFF, 1: ON		11	0 ~ 1	1
Pump P2 remote controller Display	0 = Not Shown; 1 = Shown	42	-	0 ~ 1	0
Outdoor Forced Defrost Mode	0 = Forced Defrost OFF; 1 = Forced Defrost ON	46	-	0 ~ 1	0
Optional ON/OFF Command	0 = a contact “ON” = Forced stop 1 = b contact “OFF” = Forced stop 2 = ON/OFF = Start / Stop 3= HA Specification	52	-	0 ~ 3	0
Outdoor Night Time Mode Button	0 = Symbol displayed when mode is valid (controlled by Function Code Only); 1 = Symbol displayed when mode is activated (controlled by Function Code and Button)	56	-	0 ~ 1	0
Control Logic for Room Thermostat	0 = Cooling thermo on – contact open; 1 = Cooling thermo on – contact close	57	-	0 ~ 1	0

Settings by Purpose

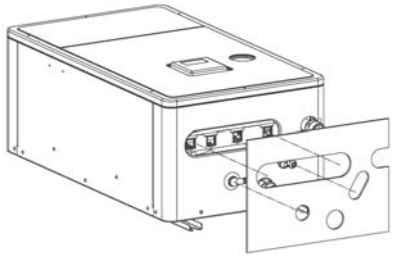
Settings when hot water supply function is not used

• When the hot water supply function is not used, set DIP SW12-1 on the Hydro Unit board to ON.

Setting for cooling

• For Space Conditioning Units that do not perform cooling (radiators and Under floor heating, etc.), procure a motorized 2-way valve (for cooling) locally and attach it to the water pipe that is not used for cooling. Connect the valve cables (as described in Electrical section).

• Press long the TEST + SET + SELECT switches on the remote controller to change the Hydro Unit function code, and change address 02 to 0, and then press the SET button to enable the function. Press the TEST button to exit the setting mode.



• Stick the optional insulator for cooling to the bottom of the Hydro Unit.

Settings for hot water supply

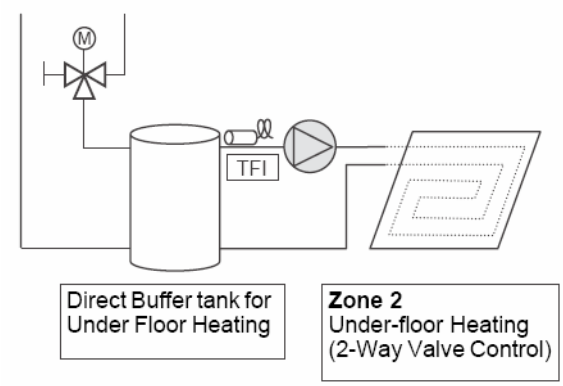
• Prepare the optional hot water cylinder.
• Procure a motorized 3-way (diverter) valve locally and perform piping. Connect the valve cables (as described in Electrical section).
• Set DIP SW12-1 on the Hydro Unit board to OFF.
• Connect the power supply unit for the hot water cylinder heater to terminals TB03 L and N of the Hydro Unit.
• Connect cables between the Hydro Unit and the hot water cylinder as follows:

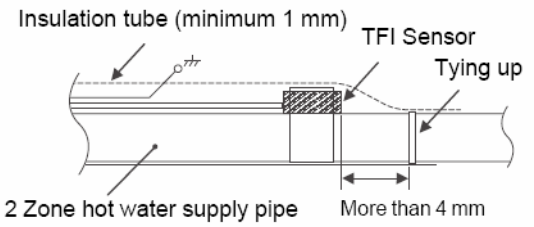
Hydro Unit terminals TB03 (1), (2), and earth — Hot water cylinder (1), (2), and earth
TB06 A, B, and earth — Hot water cylinder A, B, and earth

Settings by Purpose (cont)

Settings for 2-zone temperature control

• Procure a motorized mixing valve locally and perform piping. Connect the valve cables (as described in Electrical section).
• Procure a buffer tank locally.
• Procure a water pump locally, and connect its cables (as described in Electrical section).
To inhibit interlocking the water pump with the internal pump of the Hydro Unit, set DIP SW10-3 on the Hydro Unit board to OFF.
• Set DIP SW12-3 on the Hydro Unit board to ON.
Attach the temperature sensor (TFI) connected to terminals TB06 C and D of the Hydro Unit near the hot water inlet of the Hydro Unit.
• Contact the temperature sensor closely with the pipe, fix it with aluminium tape or the like, and then perform insulation treatment for the sensor.
• Fix TFI sensor on the room heating supply pipe by using the connector procured in locally.
• Cover the cables with insulation tube (minimum 1 mm) or conduit so that the user cannot touch them directly.
• Connect the functional earth wire of TFI sensor in the tank unit.
• Cover the TFI sensor's cables and sensor with insulation tube (minimum 1 mm) shown in the diagram on the right.





Test Run

Use operation buttons usually to conduct a test run.

If the outside air temperature or water temperature is outside the setting value range, press the TEST button on the remote controller and then start a test run. Since the protection setting is disabled in the TEST mode, do not continue a test run longer than 10 minutes.

• Press the TEST button on the remote controller. An indication “TEST” appears on the remote controller.
• Press the ZONE1, 2 (ZONE 1, 2) button and select “heating” with the OPERATE MODE button.
The pump is activated in 30 seconds.
If air is not released completely, the flow rate switch is activated to stop operation. Release air again according to the piping procedure. Little air bite is discharged from the purge valve.
• Check that the air bite sound disappears.
• Check that the hydraulic pressure has become the predetermined pressure 0.1 to 0.2 MPa (1 to 2 bar). If the hydraulic pressure is insufficient, replenish water.
• Heating operation starts. Check that the hydro unit starts heating.
• Press the OPERATE MODE button and select “cooling.”
• Cooling operation starts. Check that the hydro unit starts cooling and that the floor heating system is not cooled.
• Press the ZONE1, 2 (ZONE 1, 2) button to stop operation.
• Press the HOT WATER (HOT WATER) button to start hot water supply operation.
• Check that there is no air bite.
• Check that hot water is present at the connection port of the hot water cylinder.
• Press the HOT WATER (HOT WATER) button to stop the hot water supply operation.
• Press the TEST button to exit the test mode.

Sensor Temperature Monitoring Function

The sensor sensing temperature is displayed on the remote controller. This function allows you to make sure whether the sensor is installed properly.

1) Press the TEST + CL buttons for four seconds or more.
2) Select the Code No. with the TEMP. buttons.
3) Press the TEST button to exit the test mode.

Code No.	Location	Indication
06	Hydro unit	Return water temperature °C
08		Hot water temperature °C
09		2-zone sensor temperature °C
0A		Hot water cylinder temperature sensor °C
0B		Motorized mixing valve position
60	Outdoor unit	Heat exchanger temperature °C
61		Outside air temperature °C
62		Refrigerant discharge temperature °C
63		Refrigerant intake temperature °C
6A		Current value (in the inverter) A
70		Compressor operating frequency
F4	Operating hours	Hydro unit AC pump total operating hours x100 hours
F5		Hot water cylinder heater total operating hours x100 hours
F6		Hydro unit heater total operating hours x100 hours

Fault Symptoms

Symptom	Possible cause	Corrective action
Room is not heated or cooled. Water is not hot enough.	Incorrect remote controller setting	Check remote controller operation and temperature setting
	Incorrect function code setting	Check function code setting with the function code table.
	Backup heater disconnected	Check backup heater and bimetal thermostat.
	Insufficient capacity	Check selection of equipment.
	Sensor defect	Check whether temperature sensor is installed at the normal position.
Nothing is displayed on the remote controller.	Power is not supplied.	Check power supply wiring.
	Incorrect setting	Check DIP switch setting on the Hydro Unit board. Check the setting with the function code table.
Flow rate switch is activated. Error code [A01]	Air bite in the pump	Release air completely according to the procedure.
	Low hydraulic pressure	Set hydraulic pressure considering pipe height, and replenish water until manometer shows a value of set hydraulic pressure or more.
	Strainer is clogged.	Clean the strainer.
	Large resistance on the hydro side	Widen water path to the hydro unit or adopt a bypass valve.
	Malfunction of motorized 3-way valve for hot water supply	Check wiring and parts.
Hot water leaks from pressure relief valve.	Excessive hydraulic pressure	Set hydraulic pressure considering pipe height, and replenish water until manometer shows a value of set hydraulic pressure or more.
	Insufficient capacity of expansion tank	Check expansion tank capacity compared to total water amount. If it is insufficient, install another expansion tank.
	Expansion tank failure	Check the air pressure.

Alarm Indications

Alarm indication	Alarm description and generation/reset conditions
E03	Regular communication error between hydro unit and remote controller (system controller) If there is no regular communication from the remote controller for three minutes, the hydro unit regards it as no remote controller. If there is no communication from both sides, alarm E03 occurs. Auto-reset: When successful regular communication is made
E04	Regular communication error between hydro unit and outdoor unit When serial signal from the outdoor unit cannot be received though normal serial signal is sent to the outdoor unit 1) When serial signal cannot be received continuously for 60 seconds (S code communication) 2) Communication is still not successful for 80 seconds through three retries if serial signal cannot be received for 20 seconds after new communication (f code) starts When the remote controller starts operation, serial transmission starts with the new communication format. Auto-reset: When successful regular communication is made
F03	Condensing temperature TC sensor defect If short-circuit or open-circuit state continues for two seconds, an alarm occurs. Auto-reset: When normal value is confirmed
F10	Hydraulic heat exchanger inlet temperature TWI sensor defect If short-circuit or open-circuit state continues for two seconds, an alarm occurs. Auto-reset: When normal value is confirmed
F11	Hydraulic heat exchanger outlet temperature TWO sensor defect If short-circuit or open-circuit state continues for two seconds, an alarm occurs. Auto-reset: When normal value is confirmed
F14	Hot water cylinder temperature TTW sensor defect If short-circuit or open-circuit state continues for two seconds, an alarm occurs. Auto-reset: When normal value is confirmed
F17	Floor inlet temperature TFI sensor defect If short-circuit or open-circuit state continues for two seconds, an alarm occurs. Auto-reset: When normal value is confirmed
F18	Internal heater outlet temperature TWO sensor defect If short-circuit or open-circuit state continues for two seconds, an alarm occurs. Auto-reset: When normal value is confirmed
F23	Low-pressure sensor defect If open-circuit state continues for two seconds, an alarm occurs. Auto-reset: When normal value is confirmed
F29	Hydraulic heat exchanger EEPROM defect One mismatch is detected if there is no verification ACK after data write to the EEPROM Reset condition: This alarm is inhibited while the unit is not working. (When EEPROM1K is mounted, this alarm cannot be reset.)
F20	Floor inlet temperature TFI sensor disconnection or wrong installation (This alarm is reset by stopping operation and is checked again.)
F30	Onboard expansion IC defect This alarm is not reset automatically.
L07	Group line in an hydro unit This alarm is checked during initial communication immediately after power-on. This alarm occurs immediately after operation start. This alarm is not reset automatically. (This alarm is inhibited while the unit is not working, but occurs again after the unit operates.)
L09	Hydro unit capacity has not been set. This alarm is checked immediately after power-on. This alarm is not reset automatically. (This alarm is inhibited while the unit is not working, but occurs again after the unit operates.)
A01	Pump defect or abnormal flow rate This alarm is not reset automatically.
A02	Excessive water temperature increase by the heating heater Auto-reset:
A03	Excessive water temperature increase in the hot water cylinder
A04	Freezing is detected. Auto-reset:
A07	High-pressure switch malfunction This alarm is not reset automatically.
A08	Low-pressure sensor malfunction This alarm is not reset automatically.

Alarm Indications (cont)

A09	Overheat preventive operation malfunction Auto-reset: When operation mode is changed
A11	Release preventive operation malfunction This alarm occurs when the Hydro Unit enters the forced-stop zone 10 times.
P31	Self-hydro unit is stopped due to alarm of other hydro unit. When alarm occurs in an hydro unit in the group, other hydro units must also be stopped with refrigerant control. When alarm E03, L03 or L07 occurs in the header unit in the group, other hydro units must also be stopped because they do not know which header unit (remote controller) to follow. Auto-reset: When the first alarm is reset

Outdoor Alarm indication

Alarm indication	Main failure part	Description
F04	Outdoor unit discharge temperature sensor TD defect	When open- or short-circuit of discharge temperature sensor TD is detected
F06	Outdoor unit temperature sensor TE or TS defect	When open- or short-circuit of heat exchanger temperature sensor TE or TS is detected
F08	Outdoor unit outside air temperature sensor TO defect	When open- or short-circuit of outside air temperature sensor TO is detected
H01	Compressor breakdown	When min-Hz is reached by current release control or when short-circuit current (Idc) is detected after direct current excitation
H02	Compressor locked	When compressor lock is detected
H03	Current detector defect	When abnormal current is detected in AC-CT or phase loss is detected
H06	Low-pressure system defect	Ps pressure sensor defect or low-pressure protective operation
L29	Other outdoor unit faults	Other outdoor unit faults: 1) Inter-MCU communication error between IPDU and CDB 2) abnormal GBT heat sink temperature
L31	Phase sequence error, etc.	When phase sequence of 3-phase power supply is incorrect (thermostat OFF operation continued), etc.
P03	Abnormal outdoor unit discharge temperature	When abnormal temperature is detected by discharge temperature release control
P04	High-pressure system defect	When high-pressure switch , IOL is activated or when abnormality is detected by high-pressure release control by TE
P22	Outdoor unit fan defect	When over current or lock in outdoor unit fan drive circuit is detected
P26	Inverter Idc operation	When short-circuit protection is activated for compressor driver devices (G-Tr, IGBT)
P29	Position detection error	When compressor motor position detection error is detected

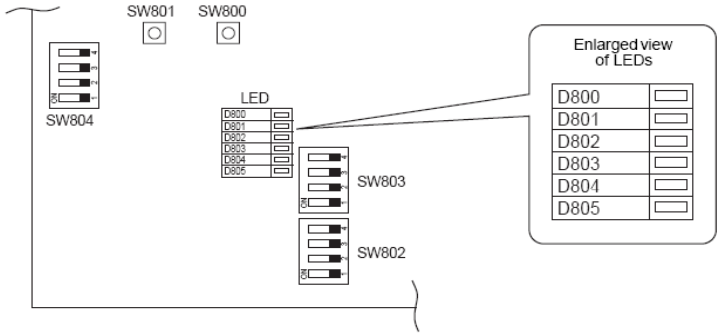
Outdoor Fault Diagnosis

You can perform fault diagnosis of the outdoor unit with the LED's on the P.C. board of the outdoor unit in addition to check codes displayed on the wired remote controller of the hydro unit.
Use the LED's and check codes for various checks.

Check of the current abnormal status

1. Check that DIP switch SW803 is set to all OFF.
2. Jot down the states of LED800 to LED804. (Display mode 1)
3. Press SW800 for at least one second. The LED status changes to display mode 2.
4. Check the code whose display mode 1 equals the jotted LED status and display mode 2 equals the current flashing status of LED800 to LED804 from the following table to identify the cause.

* The LEDs and DIP switches are located at the lower left of the P.C. board of the outdoor unit.



Check of the abnormal status in the past although the abnormal status is not occurred now.

1. Set bit 1 of DIP switch SW803 to ON.
2. Jot down the states of LED800 to LED804. (Display mode 1)
3. Press SW800 for at least one second. The LED status changes to display mode 2.
4. Find an error whose display mode 1 equals the jotted LED status and display mode 2 equals the current flashing status of LED800 to LED804 from the following table to identify the error.

• An outside **air temperature (TO) sensor error** can be checked only while an error occurs.

		DISPLAY MODE 1					DISPLAY MODE 2				
No.	Cause	D800	D801	D802	D803	D804	D800	D801	D802	D803	D804
1	Normal	●	●	●	●	●	●	●	●	●	●
2	Discharge sensor (TD) error	○	○	●	●	○	●	●	◎	●	●
3	Heat exchanger sensor (TE) error	○	○	●	●	○	●	◎	◎	●	●
4	Heat exchanger sensor (TL) error	○	○	●	●	○	◎	◎	◎	●	●
5	Outside air temperature sensor (TO) error	○	○	●	●	○	●	●	●	◎	●
6	Suction sensor (TS) error	○	○	●	●	○	●	●	◎	◎	●
7	Heat sink sensor (TH) error	○	○	●	●	○	◎	●	◎	◎	●
8	Outdoor temperature sensor (TE/TS) connection error	○	○	●	●	○	◎	◎	◎	◎	●
9	Outdoor EEPROM error	○	○	●	●	○	◎	◎	◎	◎	◎
10	Compressor lock	●	●	○	●	○	◎	●	●	●	●
11	Compressor lock	●	●	○	●	○	●	◎	●	●	●
12	Current detect circuit error	●	●	○	●	○	◎	◎	●	●	●
13	Thermostat for compressor activated	●	●	○	●	○	●	●	◎	●	●
14	Model data not set (on the service P.C. board)	●	○	○	●	○	●	◎	●	◎	●
15	MCU-MCU communication error	●	○	○	●	○	◎	●	◎	◎	◎
16	Discharge temperature error	○	○	○	●	○	◎	◎	●	●	●
17	Abnormal power (open phase detected or abnormal voltage)	○	○	○	●	○	◎	●	◎	●	●
18	Heat sink overheat	○	○	○	●	○	◎	◎	◎	●	●
19	refrigerant leak detected	○	○	○	●	○	◎	◎	◎	◎	●
20	4-way valve reverse error	○	○	○	●	○	◎	◎	●	●	◎
21	High pressure release operation	○	○	○	●	○	●	●	◎	●	◎
22	Outdoor fan motor error	○	○	○	●	○	●	◎	◎	●	◎
23	Compressor driver short circuit protection	○	○	○	●	○	●	◎	●	◎	◎
24	Position detect circuit error in one-line display	○	○	○	●	○	◎	●	◎	◎	◎

○ : ON ● : OFF ◎ : FLASHING